AD NUMBER

ADB069405

NEW LIMITATION CHANGE

TO

Approved for public release, distribution
unlimited

FROM

Distribution authorized to U.S. Gov't.
agencies only; Critical Technology; Test
and Evaluation; FEB 1982. Other requests
shall be referred to Air Force Aero
Propulsion Laboratory [AFWAL/POTX],
Wright-Patterson AFB, OH 45433.

AUTHORITY

27 Jun 1990, ST-A per WRDC-IST notice

AFWAL-TR-82-2017
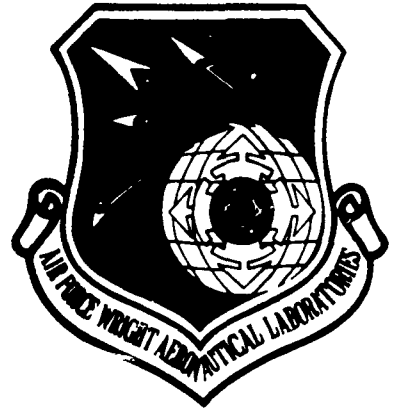
TRANSONIC FAN/COMPRESSOR ROTOR DESIGN STUDY

Volume V

D.E. Parker and M.R. Simonson

General Electric Company
Aircraft Engine Business Group
Advanced Technology Programs Dept.
Cincinnati, Ohio 45215

February 1982

Final Report for Period September 1980 - February 1982

Aero Propulsion Laboratory
Air Force Wright Aeronautical Laboratories
Air Force System Command
Wright-Patterson Air Force Base, Ohio 45433

This technical report has been reviewed and is approved for publication.

ARTHUR J. WENNERSTROM
Chief, Compressor Research Group

WALKER H. MITCHELL
Chief, Technology Branch

FOR THE COMMANDER

H. IVAN BUSH
Director, Turbine Engine Division

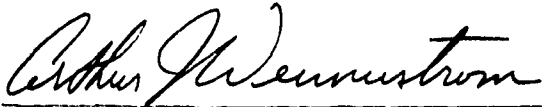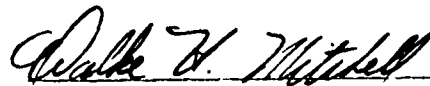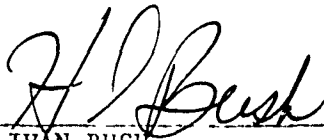| REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AFWAL-TR-82-2017	**2. GOVT ACCESSION NO.** AD-B069405L	**3. RECIPIENT'S CATALOG NUMBER**
4. TITLE *(and Subtitle)* Transonic Fan/Compressor Rotor Design Study Volume V		**5. TYPE OF REPORT & PERIOD COVERED** Final Technical Report September 1980 – July 1982
		6. PERFORMING ORG. REPORT NUMBER R82AEB328, Volume V
7. AUTHOR(*s*) D.E. Parker M.R. Simonson		**8. CONTRACT OR GRANT NUMBER(*s*)** F33615-80-C-2059
9. PERFORMING ORGANIZATION NAME AND ADDRESS General Electric Company Aircraft Engine Business Group Cincinnati, Ohio 45215		**10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS** Project 2307 Task S1 Work Unit 38
11. CONTROLLING OFFICE NAME AND ADDRESS Aero Propulsion Laboratory (AFWAL/POT) Air Force Wright Aeronautical Laboratories Air Force System Command Wright-Patterson Air Force Base, Ohio 45433		**12. REPORT DATE** September 1982
		13. NUMBER OF PAGES 117
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*		**15. SECURITY CLASS. *(of this report)*** Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Distribution limited to U.S. Government agencies only: Test and Evaluation, September 1982. Other requests for this document must be referred to Air Force Aero Propulsion Laboratory (AFWAL/POTX), Wright-Patterson AFB, OH 45433.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Fan	Aircraft Engines
Compressor	Blade Thickness
Rotor	Camber Distribution
Aerodesign	Throat Margin
Aerodynamics	

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

    Volumes I through VI of this report describes the aerodynamic design of a series of five transonic rotors all parametrically related to a baseline design documented in Technical Report AFAPL-TR-79-2078. Each of the five designs deviate from the base line, in so far as practical, by a variation of one parameter only. The parametric variations are specified at the rotor tip. The original hub characteristics were preserved to the maximum extent practical. The varied parameter was adjusted

along the span.

This volume describes the aerodynamic design details of the Phase IV rotor. The Phase IV rotor as well as the Phase III rotor described in detail in Volume IV of this report, was designed to have a steeper average suction surface angle in the supersonic region ahead of the shock than the baseline rotor. This results in a smaller cascade throat area in the outer 80% of the blade than the baseline rotor. While the throat areas of the Phase III and Phase IV rotors are essentially the same, the Phase IV blade has some what less external compression and some what more internal compression. As a result, the Phase IV blade has less suction surface (and meanline) curvatures in the region of the cascade mouth than does the Phase III rotor.

The hub region was kept essentially the same as the baseline rotor. The location of maximum airfoil thickness is 70% of length at the tip and 56% at the hub which is the same as the baseline rotor.

VOLUME V

PHASE IV ROTOR DESIGN

Foreword

This Final Technical Report was prepared by the Advanced Technology
Programs Department, Aircraft Engine Business Group, General Electric Company,
Evendale , Ohio for the United States Air Force Systems Command, Air Force
Wright Aeronautical Laboratories Wright-Patterson Air Force Base, Ohio under
Contract F33615-80-C-2059. The work was performed over a period of
one year starting in September 1980. Effren Strain (Captain USAF) was the
Air Force Project Engineer for this program.

This report describes the results of an effort to aerodynamically define
five rotor designs, all parametrically related to a base line design which
could be evaluated by future testing in order to define the sensitivity
of transonic blade rows to several design variables.

For the General Electric Company Mr. D.E. Parker was the Technical
Program Manager for this program. Mr. M.R. Simonson was the principal
investigator. Mr. A.J. Bilhardt was the overall Program Manager.

TABLE OF CONTENTS

VOLUME V

LIST OF ILLUSTRATIONS

LIST OF SYMBOLS AND ABBREVIATIONS

1. Used in Circumferential Average Flow Output Tables

STA	calculation station number	
WTF	total airflow	
PSIC	stream function (0 = tip (OD), 1 = hub (ID))	
Z	axial location	inches
R	radius	inches
PHI	streamline slope	degrees
CURV	streamline curvature ⌣ = neg., ⌢ = pos.	1/inches
VM	meridional velocity	ft/sec
CU	absolute tangential velocity	ft/sec
ALPHAM	absolute flow angle on stream surface	degrees
MM	meridional Mach number	
SL	calculation streamline number	
BLDBLK	flow blockage factor (free area − blocked area)/free area	
PS	static pressure	psia
PT	total pressure	psia
TT	total temperature	degrees
BETAM	relative flow angle on stream surface	degrees
UREL	relative velocity	ft/sec
MREL	relative Mach number	
VABS	absolute velocity	ft/sec
MABS	absolute Mach number	
GAMMA	specific heat ratio	
PT-RAT	total pressure/inlet total pressure	
TT-RAT	total temperature/inlet total temperature	
RCU	radius x tangential velocity	in-ft/sec
CZ	axial velocity	ft/sec
PCT IMM	percent annulus immersion from tip (OD)	
RAD	average of leading and trailing edge streamline radii	inches
ACC PT RATIO	cumulative total pressure ratio	
ACC TT RATIO	cumulative total temperature ratio	

LIST OF SYMBOLS AND ABBREVIATIONS

1. Used in Circumferential Average Flow Output Tables (Cont'd)

AD.	adiabatic efficiency	
POLY	polytropic efficiency	
Axial VEL R	axial velocity ratio across blade row	

2. Used in Stream Surface Blade Coordinate Tables

PT	point number	
PCT X	fraction of meridional distance from leading edge	
X	meridional coordinate on meanline	inches
Y	tangential coordinate on meanline	inches
B*M	meanline angle on stream surface	degrees
T(M)	thickness of blade perpendicular to meanline	inches
XS	meridional coordinate on suction surface	inches
YS	tangential coordinate on suction surface	inches
XP	meridional coordinate on pressure surface	inches
YP	tangential coordinate on pressure surface	inches

3. Used in Plane Section Coordinate Tables

Z	axial coordinate of stacking axis	inches
R	radius of coordinate system origin	inches
MU	tilt angle in axial direction	degrees
ETA	tilt angle in tangential direction	degrees
RHO	section height	inches
PT	point number	
ALPHA	axial coordinate	inches
ZETA*	meanline angle from axial	degrees
UPSILON	coordinate perpendicular to ALPHA and radius	inches
PCT AL	fraction of axial distance from leading edge	
T/C	local thickness/chord ratio	

SECTION XVI
DESIGN OF PHASE IV ROTOR

1. INTRODUCTION

The efficiency of a transonic rotor is influenced by shock losses as well as losses due to cascade diffusion and secondary flow effects. The magnitude of the shock losses increase rapidly as the inlet Mach number increases. The average Mach number just ahead of the leading edge passage shock is influenced by the shape of the blade suction surface ahead of the shock. Increasing the average suction surface angle ahead of the shock reduces the average Mach number ahead of the shock and presumably reduces the shock losses. However, this results in a reduced cascade throat area. If the throat is too small, the cascade will not pass the design flow and may not achieve the attached shock pattern which is desired for minimum loss.

Also if the blade suction surface angle is made steep ahead of the cascade mouth, or covered portion, it may be necessary to have a rapid change in blade meanline angle at the cascade mouth to prevent the throat from becoming too small within the covered channel. A rapid change of suction surface angle increases the surface Mach number ahead of the shock and tends to worsen the shock-boundary layer interaction. This consideration may influence the optimum throat margin for best efficiency.

For cascades having an inlet Mach number greater than about 1.3, it is possible to achieve a net precompression of the flow ahead of the passage shock and still maintain a throat area sufficiently large to pass the flow.

The maximum flow that a transonic cascade can pass is set by the average suction surface angle in the flow induction region ahead of the first captured Mach wave, provided that the throat area is sufficient and not limiting. Hence any increase in suction surface angle must take place aft of the flow induction region or there will be a reduction of flow.

To get more definitive data on the effect of the suction surface shape ahead of the leading edge passage shock, and on the interrelation of the suction surface shape and the cascade throat area, the Phase III and the Phase IV blades were designed to have smaller throat areas in the outer 80% of the blade than the base line rotor. While the throat areas of the Phase III and Phase IV rotors were essentially the same, the Phase IV blade has some what less external compression and some what more internal compression. As a result, the Phase IV

1

blade has less suction surface (and meanline) curvatures in the region of the cascade mouth than does the Phase III rotor.

2. DESIGN PROCEDURE

The "data match" circumferential average flow solution and the Stream Surface Blade Sections (SBS) analysis of the baseline rotor previously described in Volume I were used as a starting point for the design of the Phase IV rotor. Since both the Phase III and Phase IV rotors incorporated reduced throat area in the outer portion of the blade many of the design assumptions were kept the same for the two rotors. For both rotors, a higher efficiency was assumed for the outer 80% of the flow since it was believed that these blades should reduced shock losses relative to the baseline rotor. The rotor exit total pressure was maintained the same as the baseline rotor while the total temperature was reduced to reflect the assumed higher efficiency. The assumed chord-wise distribution of work was iteratively adjusted for the Phase III rotor to obtain a calculated chord-wise distribution of static pressure which had a shape similar to that of the data match calculations of the baseline rotor. However, the level of static pressure was higher in the outer portion at the rotor exit as a result of the assumed higher efficiency and consequent reduced energy input of the Phase III and IV rotors. The chord-wise distribution of work input was maintained the same for the Phase IV rotor as for the Phase III rotor. Since the blade thickness distributions were the same for both rotors, the calculated static pressure distributions were nearly the same.

The resulting streamline static pressure distribution for the Phase IV blade is compared with the data match of the baseline rotor on Figure 56.

The assumed streamline work input (as a fraction of the total streamline work) is plotted versus axial projection in Figure 57. The assumed Phase IV and Phase III work inputs are the same as previously mentioned. In Figure 57, the tip streamline is the one on the left. Each subsequent streamline is indexed to the right by the value of its stream function (fraction of the total flow from the tip). The dashed lines are lines of constant percent axial projection.

2
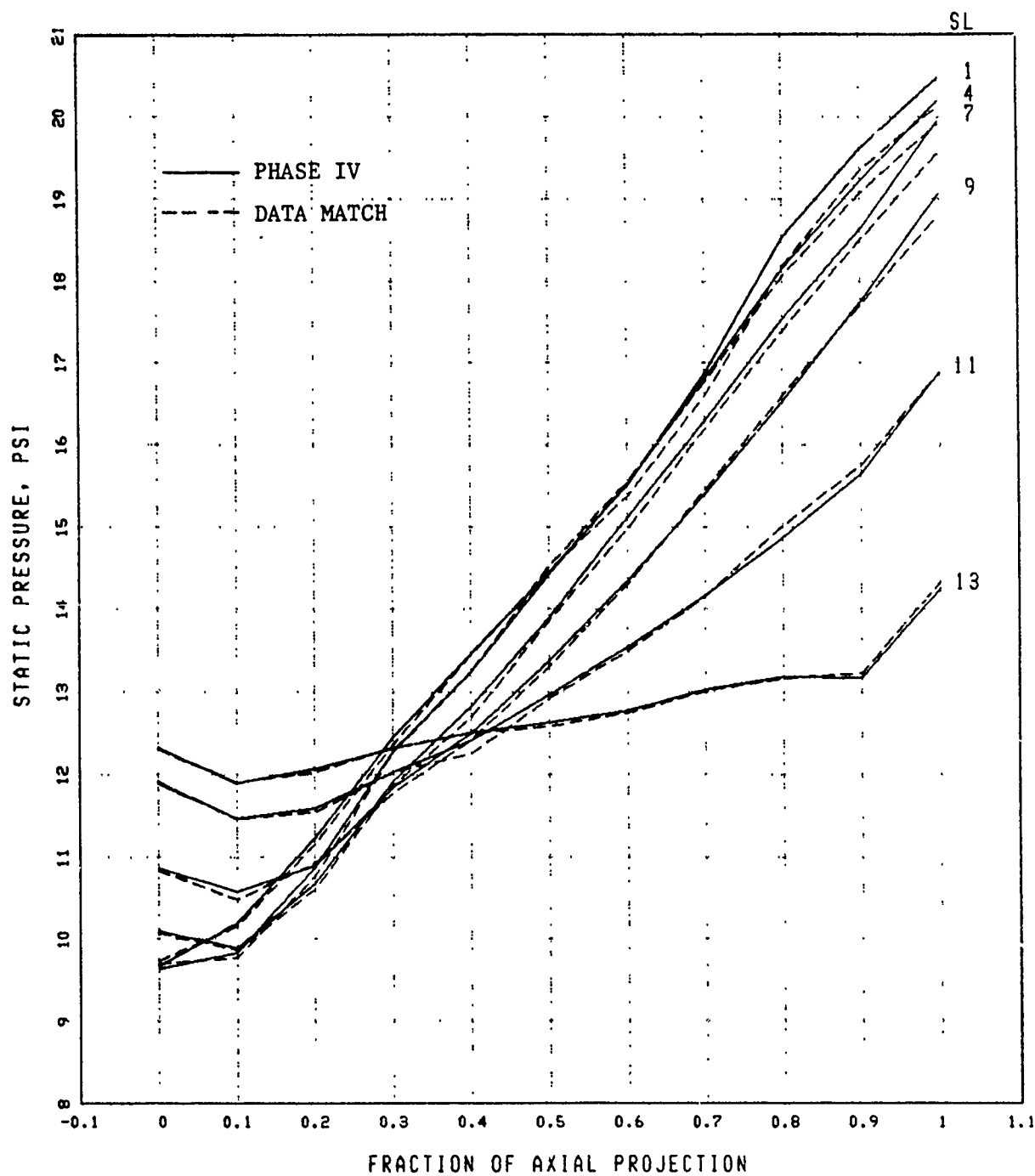
Figure 56 .   Phase IV Rotor Static Pressure Distribution
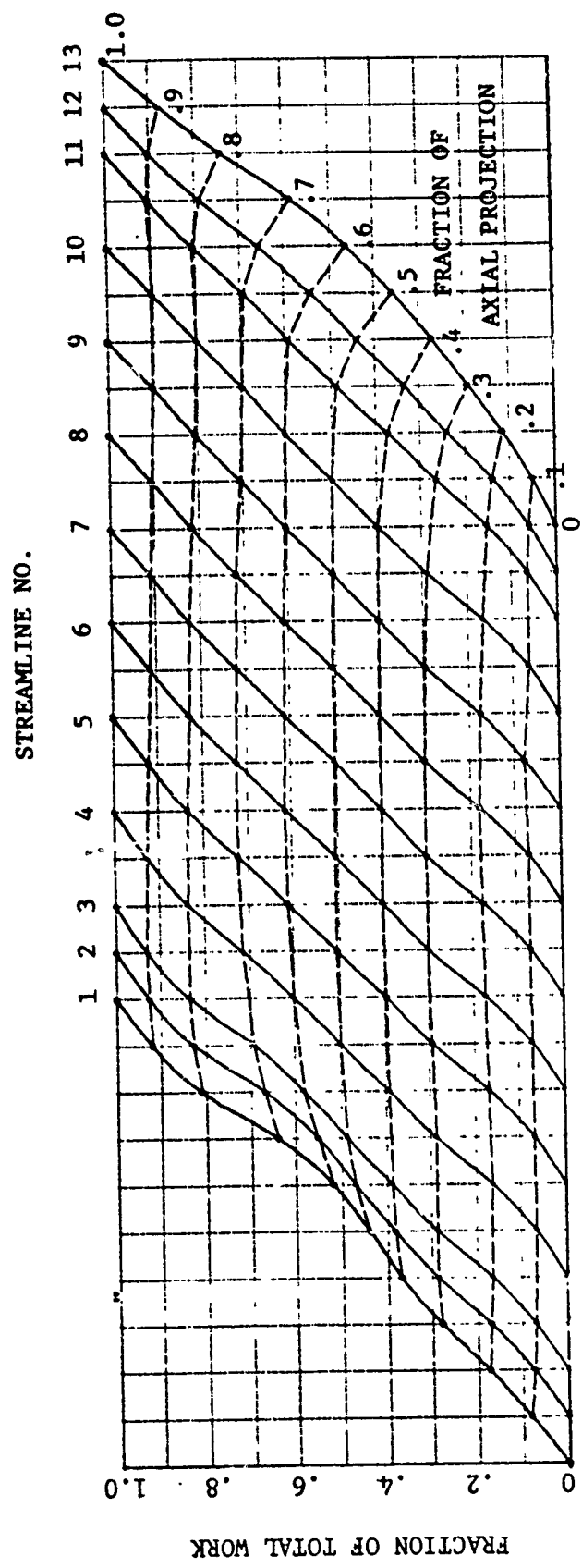
Figure 57 . Phase IV Rotor Intrablade Work Distribution

4
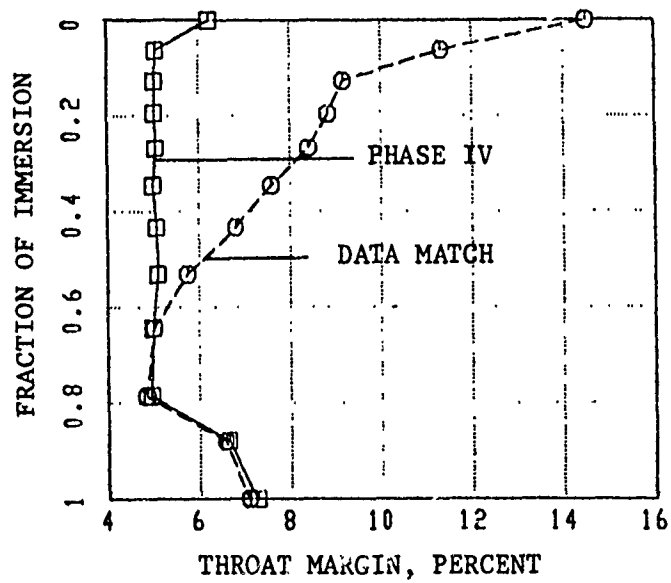
Figure 58 . Phase IV Rotor Throat Margin
Compared With Data Match

The blade meanline departure angles (the difference between the air angle and the meanline angle were adjusted to achieve the desired suction surface contour in the forward part of the blade and yet maintain sufficient throat area to pass the desired flow.

After each modification to the chordwise work distribution and/or departure angles, revised blade annulus blockage and blade lean angles were calculated and input to the circumferential Average Flow Determination (CAFD) computer program for the next iteration.

A method of characteristics computer program was used to analyze the flow in the cascade flow induction region for streamlines 3 and 6 to assure that the rotor would achieve the design flow. For other streamlines the difference between the suction surface angle and the "free-flow" streamline angle was compared with similar data from the data match calculations of the baseline rotor. This, then, was used as a guide in setting the suction surface angle in the flow induction region.

Figure 58 shows the radial distribution of the Phase IV rotor throat margin compared with the data match above. Both the Phase III and IV rotors have essentially 5 percent throat margin in the outer 80% span, except locally at the tip where the margin is a little over 6 percent. The throat margin for a stream-surface blade section is defined here as the percent of excess throat area over and above the minimum theoretical area required to pass the streamtube flow at a throat Mach number of 1.0 and assuming a total pressure loss equivalent to a normal shock at the upstream Mach number. In a rotor the effect of radius change (between the leading edge and throat) on the relative total enthalpy and pressure is included.

The radial variation of incidence angle for the Phase IV blade is shown on Figure 59. Both the Phase III and Phase IV incidence angles are nearly the same as the data match of the baseline rotor.

A modified version of Carter's Rule was used to calculate a reference deviation angle for the baseline rotor. This procedure converts the vector diagrams (from the data match calculations) to an equivalent two-dimensional set of vectors which would produce the same circulation as the actual blade taking into account the change in streamline radius and meriodional velocity. The

6

difference between the deviation angle implied by the data match calculations and the reference deviation angle was then added to the reference deviation angle calculated from the modified Carter's Rule for the Phase IV blade.

The radial distribution of the Phase IV rotor deviation angle is shown on Figure 60 and the deviation angle minus the reference deviation angle is compared with the data match values in Figure 61.

A plot of departure angles for each streamsurface section is shown in Figure 62. Once the intrablade work distribution was chosen these departure angles were required to satisfy the desired incidence angles, deviation angles, and passage area ratios. The resulting streamsurface tip section of the Phase IV rotor is compared to that of the baseline rotor in Figure 63.

The radial distribution of the stator incidence angle for the Phase IV rotor is compared with the data match of the baseline rotor in Figure 64. The lower stator incidence angle in the outer 40 percent of span for the Phase IV design is largely the result of the assumed higher efficiency in the outer portion of the rotor.

Details of the Phase IV rotor design are given in Section XVIII.
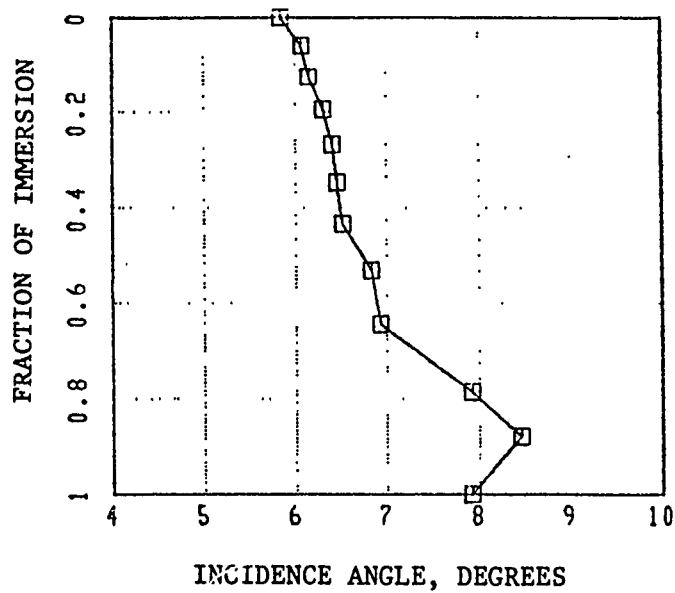
Figure __59__ .   Phase IV Rotor Incidence Angle
                    Versus Fractional Immersion
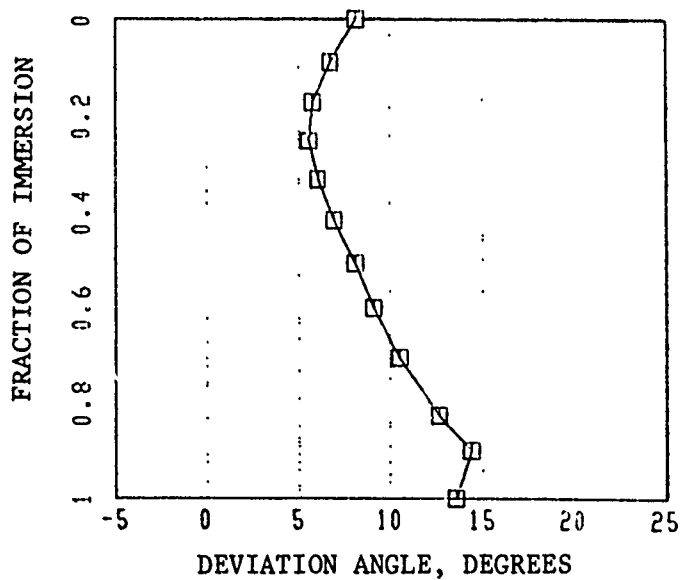
Figure __60__ .   Phase IV Rotor Deviation Angle
                    Versus Fractional Immersion
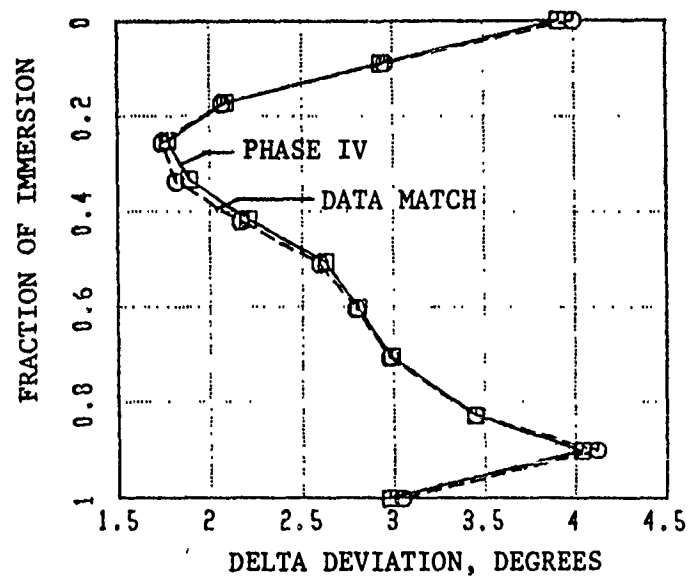
Figure _61_ . Phase IV Rotor Deviation Angle Minus
Reference Deviation Angle

DEPARTURE ANGLE, 1 DIVISION = 4 DEGREES
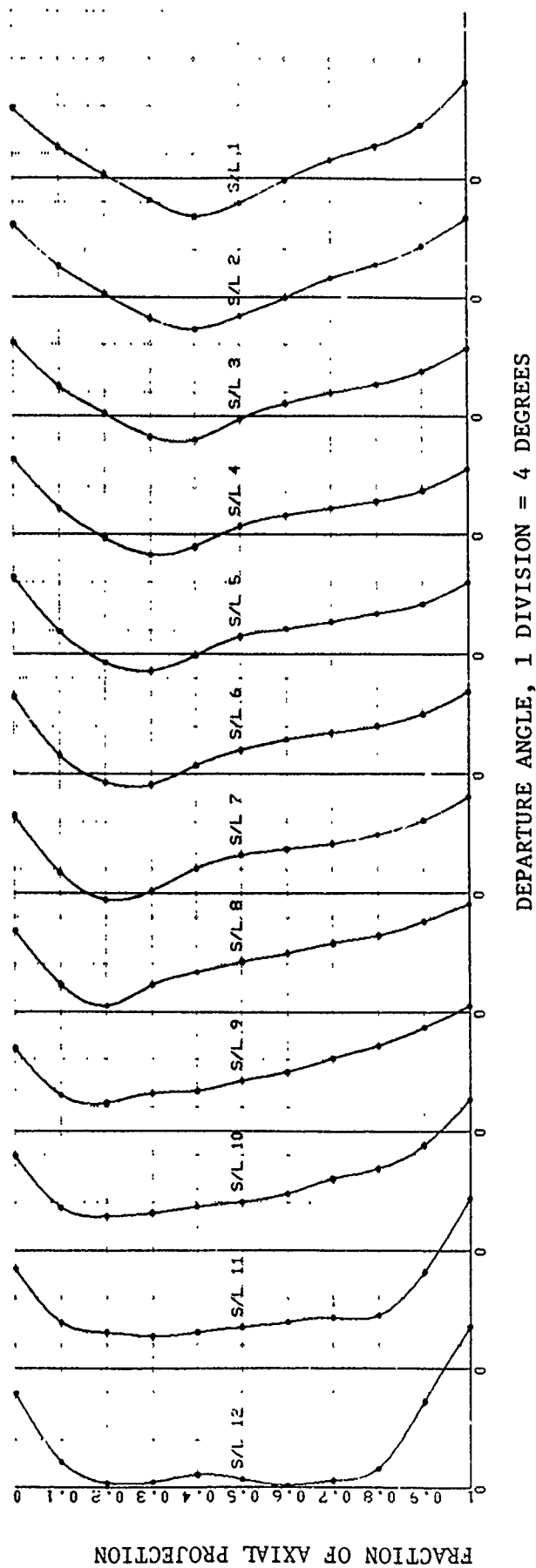
Figure 62. Phase IV Rotor Intrablade Departure Angle Distribution

FRACTION OF AXIAL PROJECTION
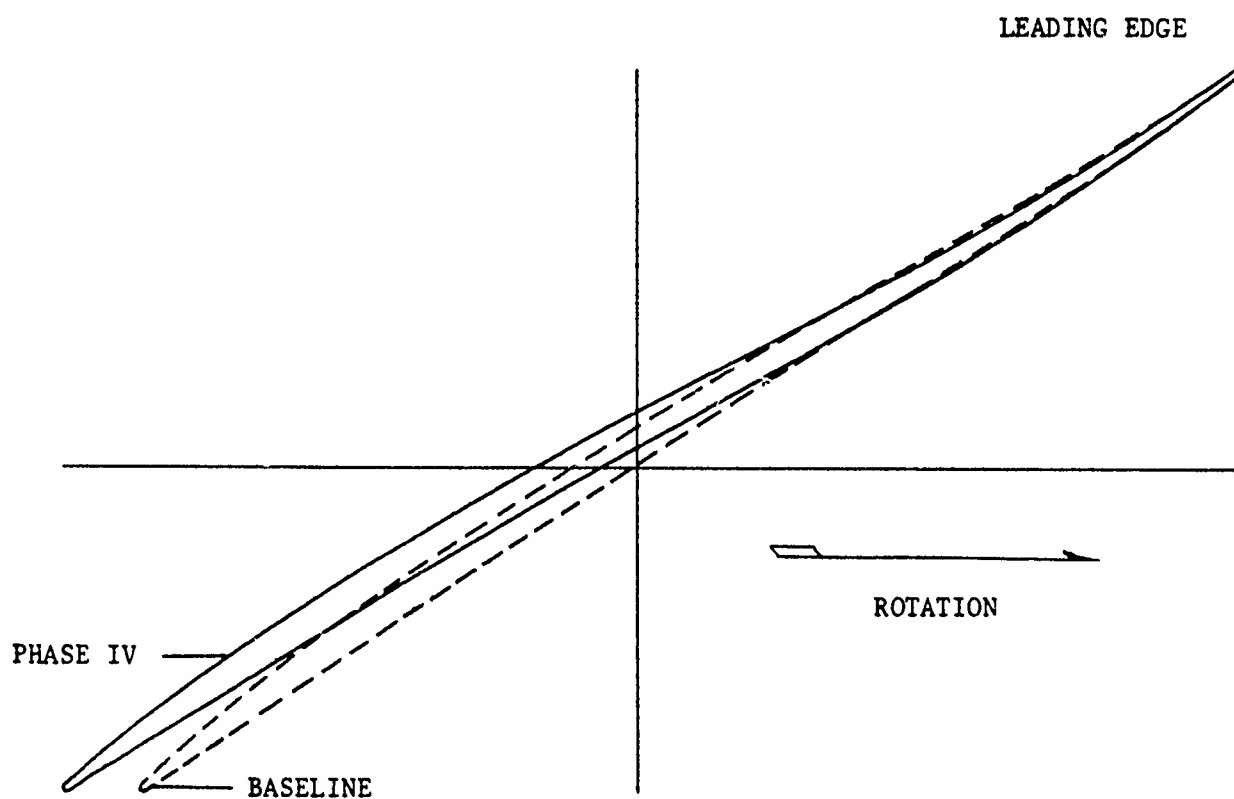
Figure 63 .   Phase IV Rotor Streamsurface Tip Section Compared
with Baseline Design
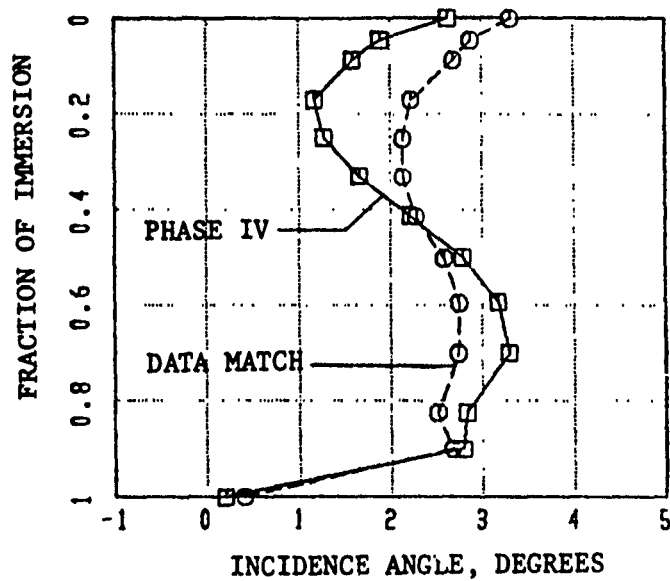
Figure 64 .   Phase IV Stator Incidence Angle
Compared With Data Match

SECTION XVII
DETAILS OF PHASE IV ROTOR DESIGN

1. CIRCUMFERENTIAL AVERAGE FLOW SOLUTION

The following tabulation presents the detail results of the Phase IV rotor circumferential average flow computation. Each page of the tabulation gives results for one calculation station. Figure 65 shows the calculation station locations within the gas flowpath. At each calculation station various aerodynamic parameters are given on each of thirteen calculation streamlines. Also given are several mass averaged station flow properties. The Phase IV rotor blade forces are included at the end of this tabulation.
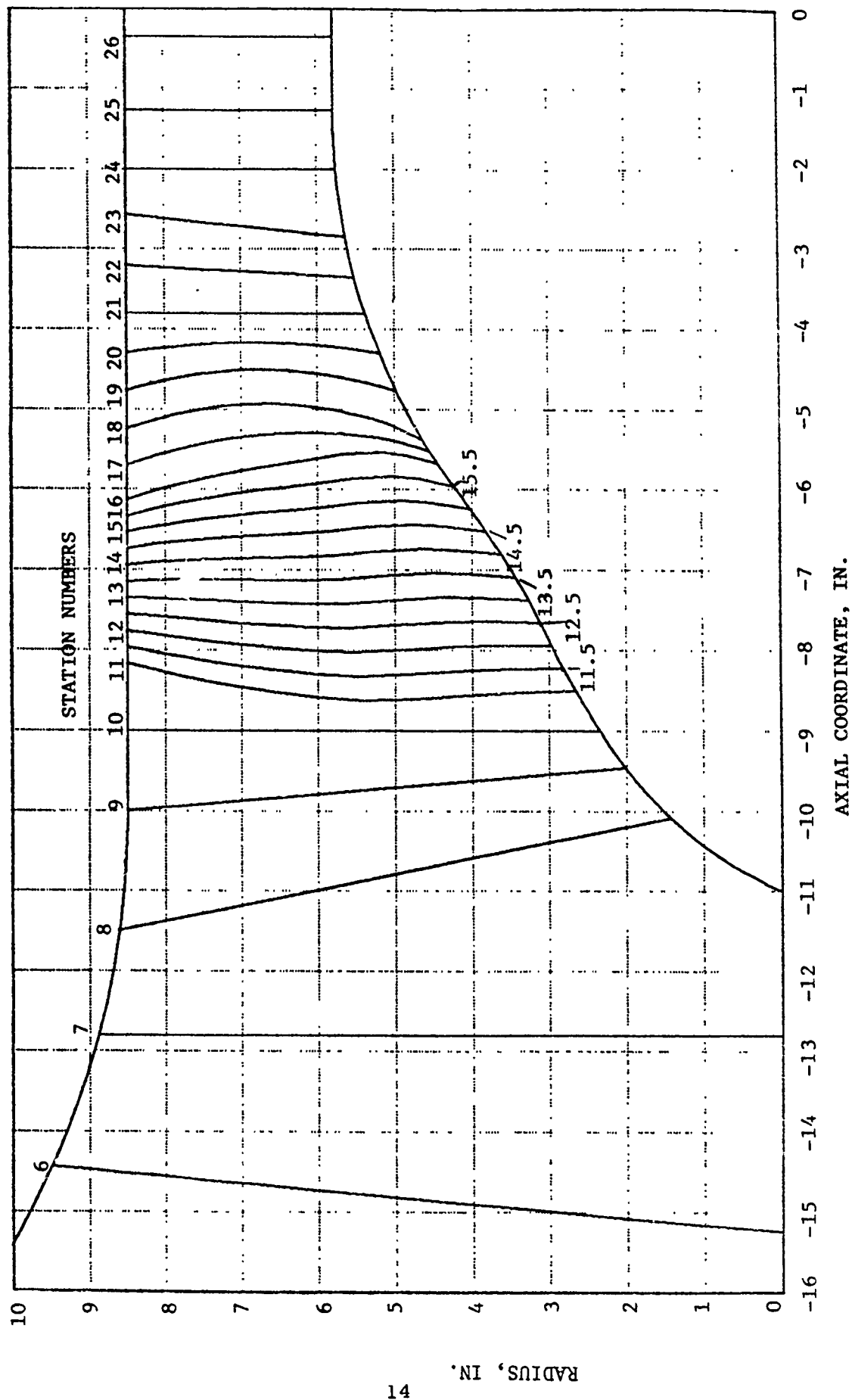
Figure 65. Compressor Flowpath With Calculation Stations

```
INLET                                    STA=  5.000                                              FREE
WTF=  61.365     I=  1                    MTIP=  1    AFLOW=  478.13    D+C=0.     D+H=0.
                 OPTX=DPP                 OPTY=FREE   ITYPE=0  INBR=0   ABC=0.     ABH=0.

 PSIC       Z        R      PHI     CURV     VM      CU   ALPHAM    MM
 0.      -18.800  13.207  -50.10   0.0831  150.4    0.     0.     0.135
 0.050   -18.800  12.564  -43.54   0.      181.0    0.     0.     0.163
 0.100   -18.800  12.020  -40.31   0.      195.9    0.     0.     0.176
 0.200   -18.800  11.027  -34.70   0.      218.6    0.     0.     0.196
 0.300   -18.800  10.099  -29.90   0.      237.1    0.     0.     0.213
 0.400   -18.800   9.193  -25.65   0.      252.4    0.     0.     0.227
 0.500   -18.800   8.277  -21.78   0.      265.2    0.     0.     0.239
 0.600   -18.800   7.319  -18.16   0.      275.9    0.     0.     0.248
 0.700   -18.800   6.277  -14.68   0.      284.9    0.     0.     0.257
 0.800   -18.800   5.083  -11.18   0.      292.5    0.     0.     0.264
 0.900   -18.800   3.569   -7.34   0.      298.9    0.     0.     0.270
 0.950   -18.800   2.516   -4.92   0.      301.6    0.     0.     0.272
 1.000   -18.800   0.000    0.     0.      303.9    0.     0.     0.274

 SL  BLDBLK    PS       PT      TT    BETAM   VREL     VM     MREL    VABS    MABS
  1   0.997   14.510  14.696  518.7  86.31  2335.4  150.4   2.095  150.4   0.135
  2   0.997   14.427  14.696  518.7  85.33  2224.5  181.0   1.997  181.0   0.163
  3   0.997   14.382  14.696  518.7  84.72  2130.2  195.9   1.913  195.9   0.176
  4   0.997   14.305  14.696  518.7  83.59  1958.1  218.6   1.760  218.6   0.196
  5   0.997   14.237  14.696  518.7  82.42  1797.9  237.1   1.617  237.1   0.213
  6   0.997   14.177  14.696  518.7  81.16  1641.9  252.4   1.477  252.4   0.227
  7   0.997   14.124  14.696  518.7  79.71  1484.6  265.2   1.337  265.2   0.239
  8   0.997   14.077  14.696  518.7  77.94  1320.6  275.9   1.190  275.9   0.248
  9   0.997   14.037  14.696  518.7  75.57  1143.7  284.9   1.031  284.9   0.257
 10   0.997   14.002  14.696  518.7  71.94   943.5  292.5   0.850  292.5   0.264
 11   0.997   13.972  14.696  518.7  64.61   697.2  298.9   0.629  298.9   0.270
 12   0.997   13.959  14.696  518.7  55.81   536.8  301.6   0.484  301.6   0.272
 13   0.997   13.947  14.696  518.7   0.00   303.9  303.9   0.274  303.9   0.274

           STA   5.000  MASS AVERAGED PROPERTIES
 PT= 14.696   TT= 518.69  GAMMA=1.4015  PT-RAT= 1.000  TT-RAT= 1.000
 RCU=  0.     VM= 255.3   CZ= 233.4  MM=0.230  MABS=0.230  MREL=1.300
```

INLET

```
INLET                        STA=  6.000              FREE
           I= 2    MTIP= 14  AFLOW= 277.56            D*H=0.
WTF= 61.365  OPTX=DPP  OPTY=FREE  ITYPE=0  INBR=0  D*C=0.  ABH=0.
                                                   ABC=0.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-14.431	9.481	-24.96	-0.0952	514.7	0.	0.	0.471
0.050	-14.450	9.254	-24.10	-0.1028	507.6	0.	0.	0.464
0.100	-14.470	9.020	-22.95	-0.0955	501.1	0.	0.	0.458
0.200	-14.513	8.532	-20.65	-0.0825	489.4	0.	0.	0.447
0.300	-14.558	8.010	-18.38	-0.0712	478.4	0.	0.	0.436
0.400	-14.606	7.446	-16.13	-0.0614	467.8	0.	0.	0.426
0.500	-14.660	6.829	-13.87	-0.0529	457.2	0.	0.	0.416
0.600	-14.719	6.141	-11.58	-0.0455	446.4	0.	0.	0.406
0.700	-14.787	5.352	-9.23	-0.0390	434.9	0.	0.	0.395
0.800	-14.869	4.403	-6.73	-0.0330	422.1	0.	0.	0.383
0.900	-14.978	3.142	-4.03	-0.0257	406.9	0.	0.	0.369
0.950	-15.057	2.234	-2.57	-0.0190	398.1	0.	0.	0.361
1.000	-15.250	-0.000	0.	0.	387.1	0.	0.	0.351

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	12.623	14.696	518.7	72.90	1750.4	1.601	514.7	0.471
2	0.997	12.676	14.696	518.7	72.73	1710.1	1.564	507.6	0.464
3	0.997	12.726	14.696	518.7	72.53	1668.8	1.525	501.1	0.458
4	0.997	12.812	14.696	518.7	71.99	1583.2	1.445	489.4	0.447
5	0.997	12.892	14.696	518.7	71.30	1492.3	1.361	478.4	0.436
6	0.997	12.968	14.696	518.7	70.40	1394.8	1.271	467.8	0.426
7	0.997	13.041	14.696	518.7	69.22	1288.9	1.174	457.2	0.416
8	0.997	13.116	14.696	518.7	67.61	1172.0	1.066	446.4	0.406
9	0.997	13.193	14.696	518.7	65.27	1039.7	0.945	434.9	0.395
10	0.997	13.277	14.696	518.7	61.49	884.2	0.803	422.1	0.383
11	0.997	13.374	14.696	518.7	53.72	687.7	0.624	406.9	0.369
12	0.997	13.429	14.696	518.7	44.72	560.3	0.508	398.1	0.361
13	0.997	13.436	14.696	518.7	-0.00	387.1	0.351	387.1	0.351

```
           STA=  6.000  MASS AVERAGED PROPERTIES
PT= 14.696  TT= 518.69  GAMMA=1.4016  PT-RAT= 1.000  TT-RAT= 1.000
RCU= 0.   VM= 455.6  CZ= 438.5  MM=0.415  MABS=0.415  MREL=1.120
```

INLET

WTF= 61.365

I= 3   MTIP= 27   AFLOW= 244.35   D+C=0.   D+H=0.
OPTX=DPP   OPTY=FREE   ITYPE=0   INBR=0   CU   ABC=0.   ABH=0.

FREE

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-12.800	8.830	-15.47	-0.0952	625.2	0.	0.	0.578
0.050	-12.800	8.675	-14.65	-0.087~	617.9	0.	0.	0.571
0.100	-12.800	8.454	-13.90	-0.0849	610.4	0.	0.	0.564
0.200	-12.800	8.021	-12.40	-0.0795	595.2	0.	0.	0.549
0.300	-12.800	7.546	-10.86	-0.0737	579.7	0.	0.	0.534
0.400	-12.800	7.032	-9.27	-0.0680	563.9	0.	0.	0.518
0.500	-12.800	6.458	-7.60	-0.0629	547.6	0.	0.	0.503
0.600	-12.800	5.837	-5.79	-0.0587	530.4	0.	0.	0.486
0.700	-12.800	5.112	-3.78	-0.0560	511.3	0.	0.	0.468
0.800	-12.800	4.237	-1.45	-0.0559	488.4	0.	0.	0.446
0.900	-12.800	3.064	1.53	-0.0634	455.8	0.	0.	0.415
0.950	-12.800	2.206	3.55	-0.0759	428.6	0.	0.	0.389
1.000	-12.800	0.000	0.	0.	383.5	0.	0.	0.347

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.998	11.714	14.696	518.7	68.25	1687.2	1.560	625.2	0.578
2	0.998	11.779	14.696	518.7	68.02	1650.9	1.525	617.9	0.571
3	0.998	11.843	14.696	518.7	67.77	1613.5	1.490	610.4	0.564
4	0.998	11.974	14.696	518.7	67.19	1535.5	1.415	595.2	0.549
5	0.998	12.104	14.696	518.7	66.48	1452.4	1.337	579.7	0.534
6	0.998	12.234	14.696	518.7	65.56	1363.1	1.253	563.9	0.518
7	0.998	12.366	14.696	518.7	64.37	1266.0	1.162	547.6	0.503
8	0.998	12.502	14.696	518.7	62.76	1158.7	1.062	530.4	0.486
9	0.998	12.649	14.696	518.7	60.46	1037.0	0.948	511.3	0.468
10	0.998	12.820	14.696	518.7	56.85	893.1	0.815	488.4	0.446
11	0.998	13.051	14.696	518.7	49.87	707.2	0.644	455.8	0.415
12	0.998	13.235	14.696	518.7	42.25	579.0	0.526	428.6	0.389
13	0.998	13.517	14.696	518.7	0.00	383.5	0.347	383.5	0.347

STA 7.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4017 PT-RAT= 1.000 TT-RAT= 1.000
RCU= 0.   VM= 539.2   CZ= 532.1   MM=0.495 MABS=0.495 MREL=1.109

INLET   STA= 8.000   FREE

      I= 4   MTIP= 40   AFLOW= 224.07   D.C=0.   D.H=0.

WTF= 61.365   OPTX=DPP   OPTV=FREE   ITYPE=0 INBR=0   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-11.499	8.608	-8.21	-0.0953	712.1	0.	0.	0.665
0.050	-11.461	8.412	-7.49	-0.0964	703.3	0.	0.	0.656
0.100	-11.421	8.211	-6.86	-0.0909	693.9	0.	0.	0.647
0.200	-11.339	7.790	-5.58	-0.0816	675.9	0.	0.	0.629
0.300	-11.250	7.341	-4.24	-0.0745	658.9	0.	0.	0.612
0.400	-11.155	6.859	-2.76	-0.0696	642.2	0.	0.	0.595
0.500	-11.052	6.334	-1.08	-0.0670	625.1	0.	0.	0.578
0.600	-10.938	5.754	0.91	-0.0669	606.2	0.	0.	0.559
0.700	-10.809	5.097	3.39	-0.0697	583.7	0.	0.	0.537
0.800	-10.656	4.320	6.71	-0.0769	554.3	0.	0.	0.509
0.900	-10.459	3.318	12.11	-0.0935	510.4	0.	0.	0.467
0.950	-10.323	2.629	17.76	-0.1212	467.9	0.	0.	0.426
1.000	-10.086	1.421	47.99	0.1910	433.8	0.	0.	0.394

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	10.918	14.696	518.7	64.88	1677.6	1.567	712.1	0.665
2	0.997	11.002	14.696	518.7	64.65	1642.6	1.533	703.3	0.656
3	0.997	11.090	14.696	518.7	64.41	1606.5	1.497	693.9	0.647
4	0.997	11.258	14.696	518.7	63.82	1531.9	1.425	675.9	0.629
5	0.997	11.414	14.696	518.7	63.04	1453.4	1.349	658.9	0.612
6	0.997	11.564	14.696	518.7	62.05	1370.2	1.269	642.2	0.595
7	0.997	11.715	14.696	518.7	60.78	1280.6	1.184	625.1	0.578
8	0.997	11.879	14.696	518.7	59.16	1182.6	1.091	606.2	0.559
9	0.997	12.070	14.696	518.7	57.02	1072.3	0.987	583.7	0.537
10	0.997	12.312	14.696	518.7	53.98	942.6	0.865	554.3	0.509
11	0.997	12.656	14.696	518.7	48.93	776.8	0.710	510.4	0.467
12	0.997	12.967	14.696	518.7	44.76	658.9	0.601	467.9	0.426
13	0.997	13.200	14.696	518.7	30.03	501.1	0.455	433.8	0.394

STA   8.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4017   PT-RAT= 1.000   TT-RAT= 1.000

RCU= 0.   VM= 612.2   CZ= 604.7   MM=0.566   MABS=0.566   MREL=1.140

18

INLET   STA= 9.000   FREE

WTF= 61.365   I= 5   MTIP= 53   AFLOW= 211.87   D+C=O.   D+H=O.

OPTX=DPP   OPTY=FREE   ITYPE=O   INBR=O   ABC=O.   ABH=O.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-9.999	8.500	0.	0.	759.3	0.	0.	0.714
0.050	-9.984	8.315	-1.10	-0.0544	752.4	0.	0.	0.706
0.100	-9.968	8.125	-0.87	-0.0527	744.4	0.	0.	0.698
0.200	-9.935	7.728	-0.24	-0.0512	730.6	0.	0.	0.684
0.300	-9.900	7.305	0.64	-0.0516	716.4	0.	0.	0.669
0.400	-9.862	6.852	1.81	-0.0538	700.8	0.	0.	0.654
0.500	-9.821	6.360	3.33	-0.0581	682.8	0.	0.	0.635
0.600	-9.776	5.817	5.26	-0.0637	660.8	0.	0.	0.613
0.700	-9.725	5.202	7.78	-0.0715	632.8	0.	0.	0.586
0.800	-9.665	4.476	11.19	-0.0791	596.1	0.	0.	0.550
0.900	-9.587	3.542	16.60	-0.0811	545.9	0.	0.	0.501
0.950	-9.536	2.920	21.65	-0.0409	515.1	0.	0.	0.471
1.000	-9.460	2.011	38.65	0.1881	511.2	0.	0.	0.468

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.996	10.461	14.696	518.7	63.15	1681.2	1.580	759.3	0.714
2	0.996	10.530	14.696	518.7	62.85	1649.0	1.548	752.4	0.706
3	0.996	10.607	14.696	518.7	62.56	1615.6	1.515	744.4	0.698
4	0.996	10.741	14.696	518.7	61.82	1547.1	1.448	730.6	0.684
5	0.996	10.878	14.696	518.7	60.94	1474.8	1.378	716.4	0.669
6	0.996	11.025	14.696	518.7	59.90	1397.6	1.304	700.8	0.654
7	0.996	11.194	14.696	518.7	58.69	1313.7	1.223	682.8	0.635
8	0.996	11.396	14.696	518.7	57.23	1220.8	1.133	660.8	0.613
9	0.996	11.647	14.696	518.7	55.42	1115.0	1.032	632.8	0.586
10	0.996	11.966	14.696	518.7	52.96	989.5	0.912	596.1	0.550
11	0.996	12.379	14.696	518.7	48.87	830.0	0.761	545.9	0.501
12	0.996	12.620	14.696	518.7	45.01	728.5	0.667	515.1	0.471
13	0.996	12.650	14.696	518.7	34.77	622.3	0.569	511.2	0.468

STA   9.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4018   PT-RAT= 1.000   TT-RAT= 1.000

RCU= 0.   VM= 663.9   CZ= 655.4   MM=0.617   MABS=0.617   MREL=1.178

INLET
STA= 10.000
FREE

I= 6   MTIP= 66   D*C=0.   D*H=0.

WTF= 61.365   OPTX=DPP   OPTY=FREE   ITYPE=0   INER=0   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	ALPHAM	CU	MM
0.	-9.000	8.500	0.	0.	775.8	0.	0.	0.731
0.050	-9.000	8.317	0.34	0.0031	776.1	0.	0.	0.731
0.100	-9.000	8.131	0.66	-0.0023	776.1	0.	0.	0.731
0.200	-9.000	7.743	1.48	-0.0130	773.3	0.	0.	0.728
0.300	-9.000	7.334	2.55	-0.0226	766.7	0.	0.	0.721
0.400	-9.000	6.898	3.95	-0.0330	755.6	0.	0.	0.710
0.500	-9.000	6.426	5.71	-0.0429	739.0	0.	0.	0.693
0.600	-9.000	5.908	8.00	-0.0588	714.7	0.	0.	0.668
0.700	-9.000	5.321	10.83	-0.0732	680.2	0.	0.	0.633
0.800	-9.000	4.626	14.41	-0.0859	633.9	0.	0.	0.587
0.900	-9.000	3.734	19.55	-0.0852	575.0	0.	0.	0.529
0.950	-9.000	3.142	23.73	-0.0845	535.5	0.	0.	0.491
1.000	-9.000	2.340	32.46	0.1922	543.3	0.	0.	0.498

SL	BLDBLK	PS	PT	TT	BETAM	VM	VREL	MREL	VABS	MABS
1	0.994	10.299	14.696	518.7	62.65	775.8	1688.8	1.591	775.8	0.731
2	0.994	10.296	14.696	518.7	62.13	776.1	1660.3	1.564	776.1	0.731
3	0.994	10.296	14.696	518.7	61.59	776.1	1631.3	1.537	776.1	0.731
4	0.994	10.323	14.696	518.7	60.49	773.3	1570.1	1.478	773.3	0.728
5	0.994	10.388	14.696	518.7	59.36	766.7	1504.3	1.415	766.7	0.721
6	0.994	10.498	14.696	518.7	58.17	755.6	1432.7	1.346	755.6	0.710
7	0.994	10.660	14.696	518.7	56.91	739.0	1357.6	1.269	739.0	0.693
8	0.994	10.894	14.696	518.7	55.57	714.7	1264.0	1.181	714.7	0.668
9	0.994	11.218	14.696	518.7	54.08	680.2	1159.5	1.079	680.2	0.633
10	0.994	11.637	14.696	518.7	52.17	633.9	1033.6	0.957	633.9	0.587
11	0.994	12.143	14.696	518.7	48.89	575.0	874.6	0.805	575.0	0.529
12	0.994	12.462	14.696	518.7	45.99	535.5	770.8	0.706	535.5	0.491
13	0.994	12.400	14.696	518.7	37.23	543.3	682.4	0.626	543.3	0.498

STA   10.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4018   PT-RAT= 1.000   TT-RAT= 1.000

RCU= 0.   VM= 706.2   CZ= 694.8   MM=0.660   MABS=0.660   MREL=1.217

ROTOR1

WTF= 61.365　　I= 7　　OPTX=DPP　　STA= 11.000　　MTIP= 79　　OPTY=FREE　　AFLOW= 197.31　　ITYPE=4　　INBR=3　　D*C=0.　　ABC=0.　　LE ROTOR　　D*H=0.　　ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-8.166	8.500	0.	0.	838.0	0.	0.	0.796
0.050	-8.204	8.322	0.42	-0.0063	840.0	0.	0.	0.799
0.100	-8.242	8.141	0.82	-0.0050	841.3	0.	0.	0.800
0.200	-8.321	7.764	1.83	-0.0054	841.9	0.	0.	0.801
0.300	-8.396	7.365	3.22	-0.0160	836.5	0.	0.	0.795
0.400	-8.465	6.940	4.95	-0.0321	822.1	0.	0.	0.780
0.500	-8.531	6.478	6.98	-0.0509	795.9	0.	0.	0.752
0.600	-8.592	5.970	9.30	-0.0504	760.8	0.	0.	0.715
0.700	-8.624	5.398	12.33	-0.0637	718.3	0.	0.	0.671
0.800	-8.604	4.735	16.17	-0.0637	668.0	0.	0.	0.621
0.900	-8.548	3.905	21.65	-0.0665	604.0	0.	0.	0.557
0.950	-8.526	3.362	25.91	-0.0614	560.2	0.	0.	0.515
1.000	-8.507	2.653	31.20	0.1471	552.0	0.	0.	0.507

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.990	9.670	14.696	518.7	60.81	1718.2	1.633	838.0	0.796
2	0.990	9.649	14.696	518.7	60.23	1691.9	1.609	840.0	0.799
3	0.990	9.636	14.696	518.7	59.64	1664.8	1.583	841.3	0.800
4	0.990	9.630	14.696	518.7	58.43	1608.0	1.529	841.9	0.801
5	0.990	9.685	14.696	518.7	57.23	1545.6	1.469	836.5	0.795
6	0.990	9.832	14.696	518.7	56.13	1475.0	1.399	822.1	0.780
7	0.990	10.098	14.696	518.7	55.15	1393.0	1.316	795.9	0.752
8	0.990	10.447	14.696	518.7	54.17	1299.5	1.222	760.8	0.715
9	0.990	10.859	14.696	518.7	52.98	1193.1	1.115	718.3	0.671
10	0.990	11.330	14.696	518.7	51.36	1069.8	0.994	668.0	0.621
11	0.990	11.898	14.696	518.7	46.76	916.3	0.845	604.0	0.557
12	0.990	12.265	14.696	518.7	46.64	816.0	0.750	560.2	0.515
13	0.990	12.331	14.696	518.7	40.31	723.8	0.664	552.0	0.507

STA　11.000　MASS AVERAGED PROPERTIES

PT= 14.696　　TT= 518.69　GAMMA=1.4018　PT-RAT= 1.000　MM=0.713　TT-RAT= 1.000

RCU= 0.　　VM= 757.5　CZ= 743.1　MM=0.713　MABS=0.713　MREL=1.262

21

ROTOR1

WTF= 61.365   I= 8   STA= 11.500   AFLOW= 181.03   D+C=0.   IN ROTOR   D+H=0.
                OPTX=TT   MTIP= 92   ITYPE=5 INBR=3   ABC=0.   ABH=0.
                           OPTY=PT

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.963	8.500	0.	0.	847.7	45.6	3.08	0.797
0.050	-7.991	8.324	0.34	0.0190	851.3	41.3	2.77	0.802
0.100	-8.020	8.144	0.74	0.0163	858.9	39.2	2.62	0.811
0.200	-8.083	7.771	1.82	0.0078	874.7	37.6	2.46	0.828
0.300	-8.143	7.380	3.39	-0.0073	886.4	39.6	2.56	0.841
0.400	-8.198	6.964	5.33	-0.0167	885.6	42.0	2.71	0.840
0.500	-8.251	6.514	7.51	-0.0143	874.2	44.9	2.94	0.828
0.600	-8.301	6.020	9.95	-0.0273	846.4	47.5	3.21	0.798
0.700	-8.324	5.466	12.92	-0.0026	813.9	56.0	3.93	0.764
0.800	-8.299	4.826	16.64	0.0116	766.1	52.2	3.89	0.715
0.900	-8.247	4.027	22.15	0.0120	713.2	61.7	4.94	0.661
0.950	-8.231	3.508	25.93	0.0593	677.2	65.0	5.48	0.626
1.000	-8.224	2.817	29.07	0.0800	653.0	68.9	6.02	0.602

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.957	10.188	15.513	530.1	59.76	1683.4	1.583	849.0	0.798
2	0.956	10.106	15.460	528.8	59.19	1662.2	1.566	852.3	0.803
3	0.955	10.007	15.440	528.1	58.43	1640.6	1.549	859.8	0.812
4	0.953	9.825	15.432	527.3	56.74	1595.0	1.511	875.5	0.829
5	0.949	9.725	15.474	527.3	54.93	1542.7	1.464	887.3	0.842
6	0.944	9.751	15.506	527.3	53.27	1480.9	1.405	886.6	0.841
7	0.935	9.886	15.525	527.3	51.64	1408.8	1.334	875.4	0.829
8	0.925	10.179	15.518	527.1	50.17	1321.5	1.247	847.8	0.800
9	0.914	10.572	15.587	527.7	48.15	1219.9	1.144	815.8	0.765
10	0.897	10.951	15.430	526.1	46.22	1107.3	1.034	767.9	0.717
11	0.880	11.468	15.419	526.0	42.30	964.3	0.894	715.9	0.664
12	0.849	11.762	15.354	525.4	39.29	874.9	0.808	680.3	0.629
13	0.812	11.897	15.248	524.4	33.26	780.9	0.720	656.6	0.606

STA   11.500   MASS AVERAGED PROPERTIES

PT= 15.471   TT= 527.14   GAMMA=1.4018   PT-RAT= 1.053   TT-RAT= 1.016
RCU= 287.0   VM= 826.6   CZ= 809.3   MM=0.778   MABS=0.780   MREL=1.273

ROTOR1

WTF= 61.365   I= 9   STA= 12.000   AFLOW= 170.42   D+C=0.   IN ROTOR
                MTIP=105   ITYPE=5 INBR=3   ABC=0.   D+H=0.
          OPTX=TT   ABH=0.
          OPTY=PT

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.759	8.500	0.	0.	815.7	96.7	6.76	0.754
0.050	-7.778	8.325	0.03	0.0004	821.5	94.3	6.55	0.761
0.100	-7.798	8.146	0.39	0.0087	830.2	92.2	6.34	0.770
0.200	-7.844	7.779	1.64	0.0185	850.9	92.2	6.18	0.793
0.300	-7.889	7.395	3.34	0.0140	870.0	97.0	6.36	0.813
0.400	-7.931	6.989	5.42	0.0045	881.0	103.1	6.67	0.825
0.500	-7.972	6.552	7.64	-0.0022	880.7	110.0	7.12	0.825
0.600	-8.010	6.072	10.07	0.0132	875.0	118.6	7.72	0.819
0.700	-8.025	5.535	12.85	0.0107	856.9	124.6	8.27	0.800
0.800	-7.995	4.917	16.54	-0.0004	821.1	131.3	9.09	0.764
0.900	-7.946	4.149	21.89	0.0168	770.5	142.5	10.48	0.713
0.950	-7.936	3.648	25.23	0.0161	734.1	147.2	11.34	0.678
1.000	-7.941	2.971	28.21	0.0136	685.7	149.9	12.33	0.631

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.935	11.232	16.462	542.9	59.83	1623.1	1.500	821.4	0.759
2	0.934	11.174	16.479	541.8	59.14	1601.5	1.483	826.9	0.766
3	0.932	11.074	16.482	540.8	58.32	1580.9	1.467	835.3	0.775
4	0.928	10.874	16.544	539.8	56.40	1537.5	1.433	855.9	0.798
5	0.922	10.725	16.655	539.8	54.24	1488.7	1.391	875.4	0.818
6	0.911	10.649	16.747	539.9	52.06	1433.1	1.342	887.0	0.830
7	0.897	10.677	16.799	539.9	49.91	1367.6	1.280	887.5	0.831
8	0.880	10.751	16.832	539.9	47.44	1293.6	1.210	883.0	0.826
9	0.862	10.894	16.760	539.0	44.84	1208.5	1.129	866.0	0.809
10	0.840	11.190	16.633	537.7	41.88	1102.9	1.026	831.6	0.774
11	0.818	11.592	16.461	536.1	37.43	970.2	0.898	783.5	0.725
12	0.776	11.826	16.281	534.5	34.08	886.3	0.818	748.7	0.691
13	0.733	12.071	15.985	531.8	28.63	781.2	0.719	701.9	0.646

STA 12.000 MASS AVERAGED PROPERTIES

PT= 16.616 TT= 539.05 GAMMA=1.4018 PT-RAT= 1.131 TT-RAT= 1.039
RCU= 691.5 VM= 838.9 CZ= 821.0 MM=0.782 MABS=0.789 MREL=1.229

23

ROTOR1

```
ROTOR1
WTF= 61.365      I=10        STA= 12.500
                 OPTX=TT     MTIP=118    AFLOW= 161.85    D+C=0.     IN ROTOR
                 OPTY=PT     ITYPE=5     INBR=3   ABC=0.  D+H=O.
                                                          ABH=O.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.556	8.500	0.	0.	778.3	155.1	11.27	0.706
0.050	-7.565	8.324	-0.22	0.0085	789.5	159.6	11.43	0.717
0.100	-7.576	8.147	0.01	0.0222	796.0	159.8	11.35	0.724
0.200	-7.606	7.785	1.19	0.0467	817.1	161.5	11.18	0.747
0.300	-7.636	7.409	3.04	0.0269	838.9	168.3	11.35	0.769
0.400	-7.664	7.014	5.14	0.0325	852.8	176.8	11.71	0.784
0.500	-7.692	6.589	7.40	0.0314	861.2	185.1	12.13	0.793
0.600	-7.720	6.123	9.80	0.0183	864.1	195.9	12.77	0.797
0.700	-7.725	5.603	12.64	0.0124	856.6	208.6	13.69	0.790
0.800	-7.690	5.007	16.35	0.0208	838.9	224.6	14.99	0.774
0.900	-7.646	4.269	21.55	0.0199	803.2	239.6	16.61	0.740
0.950	-7.641	3.786	25.03	0.0045	769.9	243.2	17.53	0.708
1.000	-7.658	3.123	28.51	-0.0461	708.8	236.1	18.42	0.650

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.911	12.446	17.585	557.5	59.94	1553.9	1.410	793.7	0.720
2	0.910	12.456	17.789	557.8	58.91	1528.9	1.389	805.4	0.732
3	0.908	12.435	17.875	557.0	58.08	1505.5	1.370	811.9	0.739
4	0.903	12.283	18.034	555.7	56.02	1462.0	1.336	832.9	0.761
5	0.896	12.126	18.213	555.4	53.63	1414.7	1.297	855.6	0.785
6	0.883	12.023	18.344	555.2	51.21	1361.2	1.251	870.9	0.801
7	0.866	11.912	18.375	554.6	48.62	1302.9	1.200	880.9	0.811
8	0.846	11.838	18.368	554.0	45.67	1236.6	1.141	886.0	0.817
9	0.827	11.845	18.309	553.1	42.32	1158.6	1.069	881.7	0.813
10	0.802	11.913	13.182	551.8	38.15	1066.8	0.984	868.5	0.801
11	0.776	12.027	17.841	548.8	32.60	953.4	0.878	838.1	0.772
12	0.728	12.121	17.487	545.8	28.90	879.3	0.809	807.4	0.743
13	0.683	12.318	16.873	540.4	23.96	775.6	0.712	747.1	0.685

```
              STA  12.500  MASS AVERAGED PROPERTIES
PT= 18.084  TT= 553.54  GAMMA=1.4017  PT-RAT= 1.231  TT-RAT= 1.067
RCU= 1184.0  VM= 828.1  CZ= 810.1  MM=0.760  MABS=0.781  MREL=1.159
```

ROTOR1

```
ROTOR1                          STA= 13.000
          I=11                  MTIP=131    AFLOW= 155.06   ITYPE=5   INBR=3          IN ROTOR
WTF= 61.365     OPTX=TT         OPTY=PT                                      D+C=0.   D+H=0.
                                                                            ABC=0.   ABH=0.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.352	8.500	0.	0.	749.6	205.9	15.36	0.670
0.050	-7.352	8.323	-0.54	0.0431	768.1	212.7	15.48	0.688
0.100	-7.354	8.146	-0.45	0.0491	783.6	215.7	15.39	0.704
0.200	-7.367	7.789	0.69	0.0261	809.7	220.8	15.25	0.731
0.300	-7.382	7.422	2.53	0.0430	831.2	227.1	15.28	0.753
0.400	-7.397	7.037	4.72	0.0220	848.0	236.6	15.59	0.771
0.500	-7.413	6.624	6.97	0.0228	853.6	245.7	16.06	0.778
0.600	-7.429	6.172	9.45	0.0240	862.9	260.4	16.79	0.788
0.700	-7.425	5.670	12.40	0.0149	865.8	277.5	17.77	0.793
0.800	-7.386	5.095	16.08	0.0093	857.7	304.1	19.52	0.786
0.900	-7.345	4.387	21.27	0.0096	828.8	327.7	21.57	0.760
0.950	-7.346	3.924	25.12	-0.0137	800.0	328.2	22.31	0.734
1.000	-7.375	3.281	29.92	-0.1052	732.1	319.0	23.55	0.670

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.888	13.462	18.599	570.2	59.92	1495.5	1.337	777.4	0.595
2	0.889	13.449	18.899	570.8	58.55	1472.3	1.319	797.0	0.714
3	0.888	13.384	19.083	570.4	57.33	1451.5	1.304	812.7	0.730
4	0.884	13.247	19.377	569.3	54.94	1409.4	1.272	839.3	0.757
5	0.877	13.082	19.574	568.3	52.48	1364.9	1.237	861.7	0.781
6	0.864	12.932	19.726	567.7	49.85	1315.1	1.195	880.4	0.800
7	0.845	12.823	19.737	566.6	47.24	1257.4	1.146	888.3	0.809
8	0.825	12.652	19.751	566.0	43.84	1196.4	1.093	901.4	0.823
9	0.803	12.500	19.693	565.0	39.86	1128.0	1.033	909.2	0.832
10	0.776	12.448	19.639	564.3	34.75	1043.9	0.956	910.0	0.834
11	0.748	12.406	19.241	561.0	28.31	941.4	0.863	891.2	0.817
12	0.702	12.346	18.696	556.6	24.48	879.0	0.806	864.7	0.793
13	0.654	12.509	17.850	549.5	19.55	776.8	0.711	798.6	0.731

```
     STA   13.000   MASS AVERAGED PROPERTIES
PT= 19.412  TT= 565.94  GAMMA=1.4016  PT-RAT= 1.321  TT-RAT= 1.091
R)U= 1605.3  VM= 829.3  CZ= 811.3  MM=0.754  MABS=0.791  MREL=1.113
```

ROTOR1   I=12   STA= 13.500   IN ROTOR

WTF= 61.365 OPTX=TT MTIP=144 AFLOW= 150.69 D+C=0. D+H=0.

                OPTY=PT   ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.148	8.500	0.	0.	707.1	243.5	19.00	0.624
0.050	-7.139	8.320	-0.72	-0.0130	735.9	260.6	19.50	0.651
0.100	-7.132	8.143	-0.74	-0.0038	754.3	270.5	19.73	0.668
0.200	-7.128	7.791	0.37	0.0210	783.8	280.1	19.66	0.697
0.300	-7.129	7.432	2.13	0.0126	806.2	289.1	19.73	0.720
0.400	-7.130	7.058	4.22	0.0437	821.3	297.6	19.92	0.737
0.500	-7.133	6.657	6.53	0.0306	833.2	307.3	20.25	0.750
0.600	-7.138	6.220	9.10	0.0166	846.2	324.6	20.99	0.764
0.700	-7.125	5.735	12.12	0.0169	854.1	344.3	21.96	0.774
0.800	-7.081	5.183	16.02	-0.0023	854.1	375.1	23.71	0.776
0.900	-7.043	4.504	21.32	-0.0151	834.6	415.8	26.48	0.760
0.950	-7.051	4.063	25.51	-0.0280	810.5	414.9	27.11	0.740
1.000	-7.092	3.450	31.86	-0.0937	759.3	402.8	27.95	0.694

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.878	14.451	19.371	579.6	60.63	1441.8	1.273	747.8	0.660
2	0.879	14.491	19.934	582.5	58.64	1414.2	1.251	780.7	0.690
3	0.880	14.513	20.312	583.5	57.11	1389.2	1.230	801.3	0.710
4	0.877	14.435	20.785	582.9	54.40	1346.4	1.198	832.4	0.741
5	0.870	14.304	21.082	581.9	51.74	1302.0	1.163	856.4	0.765
6	0.856	14.141	21.213	580.5	49.09	1254.2	1.125	873.6	0.783
7	0.836	13.915	21.204	578.9	46.16	1202.8	1.083	888.1	0.799
8	0.815	13.658	21.218	578.1	42.41	1146.1	1.035	906.4	0.819
9	0.793	13.385	21.137	576.8	38.02	1084.2	0.983	920.9	0.835
10	0.766	13.158	21.063	575.9	32.28	1010.2	0.918	932.9	0.848
11	0.737	12.971	20.793	573.8	24.42	916.6	0.835	932.5	0.849
12	0.699	12.759	20.072	568.3	20.45	865.0	0.789	910.5	0.831
13	0.649	12.629	18.981	559.6	15.13	786.7	0.719	859.5	0.785

        STA 13.500 MASS AVERAGED PROPERTIES

PT= 20.807 TT= 578.32 GAMMA=1.4015 PT-RAT= 1.416 TT-RAT= 1.115

RCU= 2026.3 VM= 813.1 CZ= 794.8 MM=0.731 MABS=0.788 MRFL=1.057

ROTOR1

		I=13	OPTX=TT	STA= 14.000	AFLOW= 147.28		D+C=0.	IN ROTOR
WTF= 61.365				MTIP=157	ITYPE=5 INBR=3		D+C=0. ABC=0.	D+H=0.
				OPTY=PT				ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.945	8.500	0.	0.	668.4	289.2	23.39	0.583
0.050	-6.925	8.318	-0.58	-0.0109	702.2	307.4	23.64	0.613
0.100	-6.910	8.141	-0.61	-0.0153	730.2	323.2	23.88	0.639
0.200	-6.890	7.792	0.28	-0.0077	764.1	336.8	23.79	0.672
0.300	-6.876	7.441	1.94	0.0134	789.2	348.6	23.83	0.697
0.400	-6.864	7.076	3.84	0.0054	802.4	360.3	24.18	0.711
0.500	-6.854	6.688	6.08	0.0259	808.1	372.1	24.72	0.718
0.600	-6.847	6.265	8.73	0.0281	823.9	389.6	25.31	0.736
0.700	-6.825	5.799	11.87	0.0116	835.5	409.2	26.09	0.750
0.800	-6.777	5.270	16.07	-0.0040	841.4	443.8	27.81	0.758
0.900	-6.742	4.622	21.73	-0.0291	831.5	490.5	30.54	0.752
0.950	-6.756	4.2.6	26.23	-0.0491	814.0	494.6	31.20	0.739
1.000	-6.809	3.632	33.48	-0.0749	782.7	490.3	32.07	0.714

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.873	15.496	20.333	591.0	61.10	1383.1	1.206	728.2	0.635
2	0.875	15.529	20.975	593.9	58.82	1356.4	1.185	766.5	0.670
3	0.876	15.543	21.541	596.1	56.74	1331.5	1.165	798.6	0.699
4	0.873	15.505	22.193	595.9	53.65	1289.1	1.133	835.1	0.734
5	0.866	15.387	22.608	595.0	50.71	1246.2	1.101	862.8	0.762
6	0.852	15.275	22.827	593.7	47.92	1197.2	1.061	879.6	0.780
7	0.832	15.111	22.836	591.9	45.00	1142.9	1.015	889.6	0.791
8	0.812	14.746	22.800	590.5	40.99	1091.6	0.975	911.4	0.814
9	0.792	14.337	22.642	588.5	36.32	1036.9	0.930	930.3	0.835
10	0.768	13.957	22.559	587.5	30.02	971.8	0.876	951.3	0.857
11	0.738	13.543	22.274	585.4	21.36	892.8	0.808	965.4	0.874
12	0.713	13.198	21.506	579.9	16.92	850.8	0.772	952.5	0.865
13	0.662	12.772	20.328	571.1	10.89	797.1	0.727	923.6	0.842

STA 14.0D0 MASS AVERAGED PROPERTIES
STA 14.ODO TT= 590.66 GAMMA=1.4014 PT-RAT= 1.515 TT-RAT= 1.139

PT= 22.266 TT= 590.66 GAMMA=1.4014 PT-RAT= 1.515 TT-RAT= 1.139
RCU= 2446.1 VM= 795.7 CZ= 777.1 MM=0.709 MABS=0.789 MREL=1.003

ROTOR1

STA= 14.500

	I=14			MTIP=170	AFLOW= 145.21		IN ROTOR	
W/F= 61.365	OPTX=TT			OPTY=PT	ITYPE=5 INBR=3		D*C=0.	D*H=0.
							ABC=0.	ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.741	8.500	0.	0.	624.1	355.6	29.68	0.536
0.050	-6.712	8.316	-0.39	-0.0189	662.5	372.5	29.35	0.570
0.100	-6.688	8.139	-0.36	-0.0253	691.8	385.7	29.14	0.597
0.200	-6.651	7.793	0.42	-0.0128	734.7	401.4	28.65	0.637
0.300	-6.622	7.449	1.81	0.0049	760.0	411.8	28.45	0.663
0.400	-6.596	7.094	3.63	0.0216	775.4	422.8	28.60	0.679
0.500	-6.574	6.717	5.79	0.0102	782.9	435.3	29.08	0.688
0.600	-6.556	6.309	8.38	0.0128	795.6	453.8	29.70	0.703
0.700	-6.525	5.861	11.70	0.0083	807.3	472.8	30.35	0.717
0.800	-6.473	5.358	16.21	-0.0106	818.2	505.7	31.72	0.731
0.900	-6.441	4.744	22.49	-0.0519	821.9	561.1	34.32	0.739
0.950	-6.461	4.354	27.41	-0.0752	812.2	580.1	35.53	0.733
1.000	-6.526	3.824	34.87	-0.0668	795.7	588.4	36.48	0.723

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.873	16.855	21.783	607.6	61.39	1303.5	1.119	718.3	0.616
2	0.876	16.867	22.483	609.8	58.82	1279.8	1.101	760.1	0.654
3	0.877	16.865	23.053	611.0	56.64	1257.9	1.085	792.0	0.683
4	0.875	16.799	23.871	610.7	52.97	1219.9	1.058	837.2	0.726
5	0.867	16.673	24.307	608.9	49.91	1180.0	1.029	864.4	0.754
6	0.855	16.507	24.524	606.9	46.92	1135.2	0.994	883.1	0.774
7	0.837	16.284	24.527	604.7	43.77	1084.2	0.953	895.8	0.788
8	0.819	15.902	24.463	602.9	39.66	1033.4	0.913	915.9	0.809
9	0.802	15.399	24.220	600.2	34.82	983.4	0.873	935.6	0.831
10	0.784	14.840	24.032	598.4	28.26	928.9	0.830	961.9	0.859
11	0.753	14.165	23.828	597.0	18.57	867.1	0.779	995.2	0.895
12	0.745	13.701	23.210	593.0	13.06	833.8	0.753	998.1	0.901
13	0.696	13.028	22.032	584.9	6.20	800.4	0.727	989.7	0.899

STA 14.500 MASS AVERAGED PROPERTIES

PT= 23.883 TT= 603.82 GAMMA=1.4012 PT-RAT= 1.625 TT-RAT= 1.164
RCU= 2894.4 VM= 770.2 CZ= 751.0 MM=0.679 MABS=0.788 MREL=0.944

28

ROTOR1 STA= 15.000 IN ROTOR

WTF= 61.365 I=15 MTIP=183 AFLOW= 144.25 D*C=0. D*H=0.

OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.538	8.500	0.	0.	578.6	451.1	37.94	0.487
0.050	-6.499	8.315	-0.32	0.0061	622.3	460.3	36.49	0.526
0.100	-6.466	8.138	-0.27	0.0110	653.9	464.4	35.38	0.556
0.200	-6.413	7.795	-0.45	0.0078	702.3	469.1	33.74	0.602
0.300	-6.369	7.457	1.73	0.0053	730.0	474.9	33.04	0.629
0.400	-6.329	7.110	3.43	0.0050	742.4	482.6	33.03	0.643
0.500	-6.296	6.745	5.63	0.0094	749.9	496.2	33.49	0.652
0.600	-6.266	6.351	8.28	-0.0010	760.4	512.4	33.98	0.665
0.700	-6.225	5.923	11.75	-0.0138	772.3	535.1	34.72	0.679
0.800	-6.169	5.447	16.51	-0.0228	785.3	570.0	35.97	0.695
0.900	-6.140	4.872	23.53	-0.0593	807.1	635.2	38.20	0.720
0.950	-6.166	4.512	28.65	-0.0547	815.1	670.0	39.42	0.732
1.000	-6.243	4.026	36.12	-0.0570	813.7	710.3	41.12	0.738

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.880	18.526	23.968	631.4	61.12	1197.9	1.009	733.6	0.618
2	0.883	18.455	24.616	631.2	58.29	1183.8	1.001	774.0	0.655
3	0.884	18.359	25.056	629.8	56.06	1171.2	0.995	802.1	0.681
4	0.881	18.147	25.716	626.2	52.23	1146.7	0.982	844.6	0.723
5	0.875	17.950	26.092	622.8	49.04	1113.7	0.960	870.9	0.751
6	0.866	17.772	26.238	619.6	46.12	1071.2	0.928	885.5	0.767
7	0.851	17.521	26.247	617.1	42.79	1021.8	0.889	899.2	0.782
8	0.838	17.081	26.080	614.4	38.66	973.8	0.851	916.9	0.801
9	0.826	16.537	25.875	611.9	33.44	925.6	0.813	939.6	0.826
10	0.814	15.867	25.673	610.0	26.49	877.4	0.776	970.3	0.858
11	0.785	14.866	25.616	609.7	15.55	837.7	0.748	1027.0	0.917
12	0.790	14.133	25.220	607.6	8.80	824.8	0.741	1055.1	0.948
13	0.743	13.189	24.388	602.8	0.01	813.7	0.738	1080.1	0.979

STA 15.000 MASS AVERAGED PROPERTIES

PT= 25.689 TT= 617.96 GAMMA=1.4010 PT-RAT= 1.748 TT-RAT= 1.191

RCU= 3375.9 VM= 740.5 CZ= 720.4 MM=0.646 MABS=0.791 MREL=0.881

ROTOR1

		STA= 15.500	AFLOW= 145.07		D*C=O.	IN ROTOR
WTF= 61.365	I=16	MTIP=196	ITYPE=5 INBR=3		D*C=O. ABC=O.	D*H*O.
	OPTX=TT OPTY=PT					ABH=O.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.334	8.500	0.	0.	542.5	512.5	43.37	0.452
0.050	-6.286	8.313	-0.38	0.0038	587.5	515.8	41.28	0.492
0.100	-6.244	8.137	-0.35	0.0017	621.4	518.2	39.82	0.523
0.200	-6.174	7.797	0.38	0.0035	671.1	519.7	37.76	0.569
0.300	-6.115	7.464	1.69	0.0004	699.7	524.2	36.84	0.598
0.400	-6.062	7.126	3.47	-0.0104	712.2	532.3	36.77	0.611
0.500	-6.015	6.772	5.77	-0.0266	714.6	546.0	37.38	0.616
0.600	-5.975	6.394	8.66	-0.0438	719.4	565.0	38.15	0.623
0.⟩0	-5.926	5.986	12.31	-0.0503	727.6	590.4	39.05	0.633
0.800	-5.864	5.539	17.17	-0.0500	741.6	629.4	40.32	0.649
0.900	-5.838	5.007	24.50	-0.0436	783.4	695.0	41.58	0.694
0.950	-5.871	4.677	29.65	-0.0480	805.8	740.4	42.58	0.720
1.000	-5.960	4.235	36.53	0.0158	842.2	799.9	43.53	0.763

SL	BLDBLK	PS	PT	PHI	TT	BETAM	VREL	MREL	VABS	MABS
1	0.898	19.610	25.440	0.	646.7	61.22	1126.7	0.938	746.3	0.621
2	0.900	19.519	26.024	-0.38	644.7	58.30	1118.1	0.936	781.8	0.654
3	0.901	19.421	26.481	-0.35	642.6	55.90	1108.3	0.932	809.1	0.681
4	0.899	19.222	27.158	0.38	637.8	51.91	1087.8	0.923	848.8	0.720
5	0.895	19.027	27.552	1.69	633.7	48.58	1057.6	0.903	874.2	0.747
6	0.890	18.851	27.730	3.47	630.2	45.52	1016.5	0.873	889.1	0.763
7	0.881	18.645	27.738	5.77	627.4	42.25	965.4	0.832	899.3	0.775
8	0.874	18.266	27.621	8.66	624.9	38.07	913.7	0.791	914.7	0.792
9	0.868	17.737	27.457	12.31	622.6	32.64	864.1	0.752	937.0	0.815
10	0.862	17.007	27.332	17.17	621.2	25.14	819.2	0.717	972.7	0.852
11	0.942	15.642	27.285	24.50	621.0	13.53	805.8	0.714	1047.2	0.928
12	0.847	14.681	27.095	29.65	620.5	6.02	810.3	0.724	1094.3	0.978
13	0.800	13.174	26.567	36.53	618.3	-3.57	843.8	0.765	1161.5	1.053

STA 15.500 MASS AVERAGED PROPERTIES

PT= 27.244 TT= 629.44 GAMMA=1.4008 PI-RAT= 1.854 TT-RAT= 1.214
RCU= 3767.1 VM= 708.3 CZ= 687.2 MM=0.612 MABS=0.790 MREL=0.828

30

ROTOR1　　　　I=17　　　STA= 16.000　　　AFLOW= 148.29　　　D*C=C.　　TE ROTOR　　D*H=0.

WTF= 61.365　OPTX=TT　MTIP=209　ITYPE=6 INBR=3　ABC=0.　ABH=0.
　　　　　　　OPTY=PT

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.131	8.500	0.	0.	505.7	557.9	47.81	0.417
0.050	-6.073	8.312	-0.17	-0.0379	555.1	557.7	45.14	0.461
0.100	-6.022	8.135	0.02	-0.0595	588.4	557.7	43.46	0.491
0.200	-5.936	7.799	0.92	-0.0831	636.9	561.6	41.41	0.536
0.300	-5.862	7.472	2.33	-0.0878	659.9	569.3	40.78	0.559
0.400	-5.795	7.143	4.16	-0.0791	668.5	581.6	41.02	0.568
0.500	-5.736	6.802	6.51	-0.0649	667.3	598.3	41.88	0.569
0.600	-5.684	6.440	9.42	-0.0457	668.2	620.7	42.89	0.572
0.700	-5.626	6.054	12.94	-0.0213	675.9	650.2	43.89	0.582
0.800	-5.560	5.635	17.44	0.0205	690.9	690.1	44.97	0.599
0.900	-5.537	5.145	24.03	0.0932	724.5	746.5	45.86	0.635
0.950	-5.576	4.845	28.42	0.1739	761.0	792.1	46.14	0.673
1.000	-5.677	4.442	35.49	0.0883	785.8	870.1	47.91	0.704

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.926	20.471	26.560	658.0	61.77	1069.3	0.883	753.0	0.622
2	0.927	20.358	27.120	654.9	58.59	1065.2	0.885	786.9	0.653
3	0.927	20.281	27.560	652.0	56.17	1056.9	0.882	810.7	0.677
4	0.927	20.198	28.390	647.4	51.98	1034.1	0.870	849.1	0.715
5	0.928	20.155	28.940	643.7	48.63	998.5	0.845	871.5	0.738
6	0.928	20.094	29.280	640.8	45.44	952.8	0.810	886.1	0.753
7	0.928	19.948	29.380	638.3	42.06	898.8	0.767	896.2	0.765
8	0.928	19.611	29.350	636.2	37.66	844.1	0.723	912.1	0.781
9	0.928	19.063	29.280	634.4	31.74	794.7	0.684	937.9	0.807
10	0.928	18.246	29.160	633.0	23.77	754.9	0.654	976.5	0.846
11	0.930	16.879	28.920	631.6	12.56	742.2	0.650	1040.3	0.912
12	0.914	15.693	28.770	631.5	4.73	763.6	0.676	1098.4	0.972
13	0.875	14.247	28.650	632.3	-6.27	790.6	0.708	1172.5	1.051

STA. 16.000　MASS AVERAGED PROPERTIES

PT= 28.783　TT= 640.23　GAMMA=1.4006　PT-RAT= 1.959　TT-RAT= 1.234
RCU= 4135.2　VM= 663.3　CZ= 643.9　MM=0.568　MABS=0.783　MREL=0.768

AVERAGE

PCT IMM	RAD	BLADE SPEED IN	OUT	ACC PT RATIO	ACC TT RATIO	EFFICIENCY AD.	POLY	AXIAL VEL R
0.0	8.500	1500.0	1500.0	1.8073	1.2686	0.686	0.711	0.604
3.7	8.317	1468.6	1466.9	1.8454	1.2626	0.729	0.751	0.661
7.3	8.138	1435.6	1435.7	1.8753	1.2570	0.766	0.786	0.699
14.5	7.781	1370.1	1376.3	1.9318	1.2481	0.835	0.849	0.757
21.8	7.419	1299.7	1318.6	1.9692	1.2410	0.887	0.897	0.789
29.5	7.041	1224.6	1260.6	1.9924	1.2354	0.925	0.932	0.814
37.6	6.640	1143.3	1200.4	1.9992	1.2306	0.950	0.955	0.839
46.3	6.205	1053.6	1136.5	1.9971	1.2266	0.965	0.969	0.878
56.0	5.726	952.6	1068.3	1.9924	1.2231	0.977	0.979	0.939
66.9	5.185	835.6	994.4	1.9842	1.2204	0.982	0.984	1.027
80.3	4.525	689.0	907.9	1.9679	1.2177	0.981	0.983	1.179
88.8	4.103	593.3	855.0	1.9577	1.2175	0.974	0.976	1.328
100.0	3.547	468.2	783.8	1.9495	1.2190	0.960	0.964	1.355

FREE

WTF= 61.365   I=18   STA= 17.000 AFLOW= 146.20 D+C=0. FREE
           OPTX=DPP MTIP=222   D+H=0.
                  OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.000	-5.700	8.500	0.	0.	501.9	557.9	48.02	0.414
0.050	-5.639	8.314	0.77	-0.0380	554.2	557.6	45.17	0.460
0.100	-5.587	8.141	1.46	-0.0559	589.7	557.3	43.38	0.492
0.200	-5.500	7.813	2.78	-0.0654	644.5	560.6	41.02	0.543
0.300	-5.431	7.497	4.13	-0.0583	673.9	567.4	40.09	0.571
0.400	-5.376	7.180	5.65	-0.0442	690.0	578.6	39.98	0.588
0.500	-5.333	6.852	7.50	-0.0201	695.7	593.9	40.49	0.595
0.600	-5.305	6.506	9.80	0.0107	698.0	614.5	41.36	0.599
0.700	-5.294	6.131	12.71	0.0445	702.4	642.1	42.43	0.606
0.800	-5.303	5.714	16.65	0.0831	707.5	680.5	43.89	0.614
0.900	-5.350	5.226	22.56	0.1592	723.1	735.0	45.47	0.633
0.950	-5.405	4.934	26.26	0.2181	742.9	777.8	46.32	0.655
1.000	-5.521	4.550	33.90	0.2101	734.4	849.4	49.16	0.652

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	20.488	26.533	658.0	61.96	1067.5	0.881	750.4	0.619
2	0.940	20.348	27.093	654.9	58.65	1065.2	0.885	786.2	0.653
3	0.940	20.251	27.532	652.0	56.16	1058.8	0.884	811.3	0.677
4	0.940	20.112	28.390	647.4	51.77	1041.6	0.877	854.2	0.719
5	0.940	19.989	28.940	643.7	48.28	1012.5	0.858	880.9	0.747
6	0.940	19.834	29.280	640.8	44.93	974.7	0.830	900.5	0.767
7	0.940	19.610	29.380	638.3	41.50	928.8	0.794	914.7	0.782
8	0.940	19.280	29.350	636.2	37.39	878.6	0.754	930.0	0.798
9	0.940	18.806	29.280	634.4	32.05	828.8	0.715	951.7	0.821
10	0.940	18.149	29.160	633.0	24.86	779.8	0.676	981.7	0.851
11	0.940	17.052	28.920	631.6	14.51	747.0	0.654	1031.1	0.902
12	0.940	16.124	28.770	631.5	7.12	748.7	0.660	1075.6	0.948
13	0.940	15.135	28.564	632.3	-3.63	735.8	0.653	1122.9	0.997

STA 17.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 640.23 GAMMA=1.4006 PT-RAT= 1.958 TT-RAT= 1.234

RCU= 4135.2 VM= 675.4 CZ= 657.4 MM=0.578 MABS=0.788 MREL=0.781

STATOR   I=19   STA= 18.000   AFLOW= 141.61   LE STATOR

WTF= 61.365   OPTX=DPP MTIP=235 OPTY=FREE ITYPE=1 INBR=4 D*C=0. D*H=0.

                                                                        ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-5.250	8.500	0.	0.	540.3	557.9	45.92	0.447
0.050	-5.133	8.324	1.41	-0.0113	583.1	557.0	43.69	0.485
0.100	-5.143	8.157	2.40	-0.0179	613.9	556.2	42.17	0.513
0.200	-5.064	7.840	3.87	-0.0218	666.1	558.7	39.99	0.562
0.300	-5.005	7.533	5.07	-0.0186	697.4	564.7	39.00	0.592
0.400	-4.963	7.224	6.34	-0.0144	717.4	575.1	38.72	0.613
0.500	-4.938	6.906	7.85	-0.0108	727.5	589.2	39.01	0.624
0.600	-4.933	6.569	9.77	-0.0077	733.7	608.5	39.67	0.632
0.700	-4.952	6.206	12.30	-0.0034	740.9	634.3	40.57	0.641
0.800	-5.003	5.801	15.81	0.0102	749.1	670.4	41.82	0.652
0.900	-5.107	5.322	21.14	0.0299	759.8	721.7	43.53	0.667
0.950	-5.201	5.029	24.69	0.0250	752.4	763.0	45.40	0.663
1.000	-5.375	4.643	31.23	0.3271	804.6	832.3	45.97	0.719

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	20.100	26.533	658.0	60.17	1086.1	0.899	776.6	0.643
2	0.940	20.035	27.093	654.9	57.41	1082.4	0.901	806.3	0.671
3	0.940	19.976	27.532	652.0	55.20	1075.7	0.900	828.4	0.693
4	0.940	19.852	28.390	647.4	51.08	1060.3	0.894	869.4	0.733
5	0.940	19.697	28.940	643.7	47.64	1034.9	0.879	897.3	0.762
6	0.940	19.489	29.280	640.8	44.29	1002.2	0.856	919.4	0.785
7	0.940	19.213	29.380	638.3	40.87	962.0	0.825	936.2	0.803
8	0.940	18.848	29.350	636.2	36.89	917.4	0.79C	953.2	0.821
9	0.940	18.364	29.2R0	634.4	31.88	872.5	0.755	975.3	0.844
10	0.940	17.704	29.160	633.0	25.25	828.3	0.721	1005.3	0.875
11	0.940	16.734	28.920	631.6	15.97	790.3	0.693	1048.0	0.919
12	0.940	16.199	28.770	631.5	9.39	762.7	0.672	1071.6	0.944
13	0.940	14.482	28.564	632.3	-0.92	804.7	0.719	1157.6	1.034

STA 18.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 640.23 GAMMA=1.4007 PT-RAT= 1.958 TT-RAT= 1.234

RCU= 4135.2 VM= 706.6 CZ= 689.3 MM=0.607 MABS=0.806 MREL=0.811

STATOR   STA= 19.000   IN STATOR

I=20   MTIP=248   AFLOW= 126.06   D*C=0.   D*H=0.

WTF= 61.365   OPTX=DPP   OPTY=BETM   TYPE=2   INBR=4   ABC=0.   AIH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-4.770	8.500	0.	0.	611.1	373.3	31.42	0.503
0.050	-4.724	8.336	1.11	0.0336	640.5	382.7	30.86	0.530
0.100	-4.683	8.177	1.97	0.0504	664.5	389.5	30.38	0.552
0.200	-4.617	7.871	3.38	0.0600	709.7	404.7	29.69	0.595
0.300	-4.567	7.572	4.63	0.0536	740.7	415.4	29.29	0.625
0.400	-4.532	7.273	5.98	0.0439	762.5	425.0	29.13	0.647
0.500	-4.512	6.965	7.55	0.0347	775.3	433.6	29.22	0.661
0.600	-4.508	6.643	9.49	0.0298	785.2	444.3	29.50	0.672
0.700	-4.524	6.298	11.93	0.0332	798.0	461.6	30.05	0.685
0.800	-4.565	5.923	15.09	0.0448	816.4	489.2	30.93	0.705
0.900	-4.640	5.497	19.47	0.0875	845.4	529.3	32.05	0.736
0.950	-4.696	5.254	22.44	0.1170	870.3	556.9	32.61	0.762
1.000	-4.770	4.975	26.23	0.1265	902.6	595.0	33.40	0.796

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.875	20.984	26.533	658.0	61.53	1281.8	1.054	716.1	0.589
2	0.877	20.957	27.093	654.9	59.52	1262.8	1.044	746.1	0.617
3	0.878	20.900	27.532	652.0	57.76	1245.5	1.035	770.2	0.640
4	0.879	20.739	28.390	647.4	54.21	1213.5	1.017	817.0	0.685
5	0.880	20.546	28.940	643.7	51.19	1181.8	0.998	849.2	0.717
6	0.881	20.332	29.280	640.8	48.39	1148.2	0.975	872.9	0.741
7	0.880	20.092	29.380	638.3	45.74	1110.8	0.947	888.3	0.757
8	0.880	19.792	29.350	636.2	42.83	1070.7	0.916	902.2	0.772
9	0.878	19.360	29.280	634.4	39.16	1029.1	0.884	921.9	0.792
10	0.875	18.708	29.160	633.0	34.26	987.8	0.853	951.8	0.822
11	0.867	17.686	28.920	631.6	27.53	953.3	0.830	997.4	0.868
12	0.857	16.922	28.770	631.5	23.04	945.8	0.828	1033.2	0.904
13	0.837	15.919	28.564	632.3	17.40	945.9	0.834	1081.1	0.953

STA 19.000 MASS AVERAGED PROPERTIES

PT= 28.777   TT= 640.23   GAMMA=1.4005   PT-RAT= 1.958   TT-RAT= 1.234

RCU= 3035.9   VM= 765.4   CZ= 749.0   MM=0.653   MABS=0.756   MREL=0.940

STATOR

	I=21	STA= 20.000			IN STATOR	
	OPTX=DPP	MTIP=261	AFLOW= 118.88	D*C=O.	D*H=0.	
WTF= 61.365	OPTY=BETM	ITYPE=2	INBR=4	ABC=O.	ABH=0.	

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-4.300	8.500	0.	0.	650.4	260.5	21.82	0.534
0.050	-4.277	8.342	0.62	0.0043	680.0	269.8	21.64	0.561
0.100	-4.258	8.188	1.25	0.0088	702.1	276.4	21.49	0.582
0.200	-4.225	7.890	2.52	0.0159	743.0	288.8	21.24	0.622
0.300	-4.201	7.599	3.86	0.0202	769.5	295.9	21.03	0.648
0.400	-4.184	7.307	5.30	0.0237	787.9	300.9	20.90	0.666
0.500	-4.174	7.008	6.92	0.0298	798.3	304.2	20.86	0.677
0.600	-4.173	6.697	8.82	0.0399	806.6	308.4	20.93	0.687
0.700	-4.180	6.369	11.06	0.0535	818.1	316.5	21.15	0.699
0.800	-4.199	6.018	13.80	0.0746	835.5	330.6	21.59	0.716
0.900	-4.2?2	5.632	17.31	0.0876	859.0	350.5	22.20	0.740
0.950	-4.260	5.420	19.54	0.1002	875.5	363.0	22.52	0.757
1.000	-4.300	5.188	22.50	0.1259	896.3	378.8	22.91	0.777

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.202	26.533	658.0	62.31	1399.8	1.150	700.7	0.575
2	0.851	21.174	27.093	654.9	60.51	1381.2	1.141	731.5	0.604
3	0.852	21.143	27.532	652.0	59.00	1363.3	1.131	754.6	0.626
4	0.855	21.068	28.390	647.4	56.05	1330.4	1.113	797.2	0.667
5	0.857	20.974	28.940	643.7	53.63	1297.8	1.092	824.5	0.694
6	0.859	20.855	29.280	640.8	51.44	1264.1	1.069	843.4	0.713
7	0.860	20.704	29.380	638.3	49.43	1227.5	1.042	854.3	0.725
8	0.860	20.492	29.350	636.2	47.28	1188.9	1.012	863.6	0.735
9	0.858	20.176	29.280	634.4	44.63	1149.4	0.982	877.1	0.749
10	0.855	19.688	29.160	633.0	41.20	1110.4	0.952	898.6	0.770
11	0.847	18.975	28.920	631.6	36.83	1073.2	0.925	927.8	0.800
12	0.840	18.511	28.770	631.5	34.14	1057.7	0.914	947.7	0.819
13	0.828	17.927	28.564	632.3	30.91	1044.7	0.906	973.0	0.843

STA 20.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 640.23 GAMMA=1.4004 PT-RAT= 1.958 TT-RAT= 1.234

RCU= 2126.1 VM= 789.4 CZ= 776.2 MM=0.669 MABS=0.719 MREL=1.034

STATOR

```
WTF= 61.365   I=22      STA= 21.000   AFLOW= 115.15           IN STATOR
              OPTX=DPP  MTIP=274   OPTY=BETM   ITYPE=2   INBR=4   D+C=0.  D+H=0.
                                                                 ABC=0.  ABH=0.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-3.800	8.500	0.	0.	666.1	168.6	14.20	0.546
0.050	-3.800	8.346	0.53	0.0026	696.9	174.0	14.02	0.575
0.100	-3.800	8.197	1.07	0.0044	719.7	177.6	13.86	0.596
0.200	-3.800	7.907	2.22	0.0087	761.5	184.2	13.59	0.636
0.300	-3.800	7.624	3.46	0.0148	787.7	187.9	13.41	0.662
0.400	-3.800	7.340	4.79	0.0223	805.7	190.3	13.29	0.680
0.500	-3.800	7.051	6.26	0.0314	815.7	191.4	13.21	0.691
0.600	-3.800	6.752	7.93	0.0424	823.2	192.4	13.16	0.699
0.700	-3.800	6.439	9.85	0.0550	832.6	195.4	13.20	0.709
0.800	-3.800	6.109	12.10	0.0701	844.7	201.9	13.44	0.721
0.900	-3.800	5.757	14.93	0.0973	860.2	211.2	13.79	0.737
0.950	-3.800	5.571	16.61	0.1113	872.3	215.8	13.90	0.749
1.000	-3.800	5.376	18.63	0.1266	886.3	220.6	13.98	0.762

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.391	26.533	658.0	63.42	1488.8	1.221	687.1	0.564
2	0.850	21.369	27.093	654.9	61.78	1474.0	1.216	718.3	0.592
3	0.851	21.345	27.532	652.0	60.44	1458.9	1.209	741.3	0.614
4	0.853	21.293	28.390	647.4	57.84	1430.8	1.195	783.4	0.654
5	0.855	21.224	28.940	643.7	55.77	1400.2	1.177	809.8	0.681
6	0.856	21.128	29.280	640.8	53.90	1367.6	1.155	827.9	0.699
7	0.858	20.996	29.380	638.3	52.23	1331.9	1.128	837.8	0.710
8	0.858	20.817	29.350	636.2	50.51	1294.5	1.099	845.3	0.718
9	0.859	20.571	29.280	634.4	48.50	1256.4	1.070	855.2	0.728
10	0.858	20.232	29.160	633.0	46.05	1217.1	1.039	868.4	0.742
11	0.855	19.739	28.920	631.6	43.10	1178.0	1.010	885.7	0.759
12	0.854	19.404	28.770	631.5	41.33	1161.7	0.997	898.6	0.771
13	0.852	19.011	28.564	632.3	39.40	1147.0	0.986	913.4	0.785

```
          STA  21.000  MASS AVERAGED PROPERTIES
PT= 28.776  TT= 640.23  GAMMA=1.4003  PT-RAT= 1.958  TT-RAT= 1.234
RCU= 1341.1  VM= 802.9   CZ= 792.8  MM=0.679  MABS=0.698  MREL=1.119
```

STATOR

STA= 22.000
WTF= 61.365   I=23   OPTX=DPP   MTIP=287   AFLOW= 114.73   D+C=0.   IN STATOR   D+H=0.
                                  OPTY=BETM ITYPE-2 INBR=4   ABC-C.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-3.204	8.500	0.	0.	656.9	82.9	7.19	0.538
0.050	-3.211	8.351	0.54	-0.0034	688.5	85.5	7.08	0.566
0.100	-3.218	8.207	1.03	-0.0021	711.4	87.0	6.97	0.588
0.200	-3.232	7.928	1.98	0.0060	753.6	89.8	6.79	0.628
0.300	-3.245	7.655	2.99	0.0147	780.3	91.1	6.66	0.654
0.400	-3.259	7.383	4.08	0.0234	798.8	91.8	6.56	0.672
0.500	-3.272	7.105	5.30	0.0318	808.9	91.9	6.48	0.683
0.600	-3.286	6.818	6.68	0.0418	816.1	92.0	6.43	0.691
0.700	-3.301	6.519	8.28	0.0537	825.0	92.9	6.43	0.700
0.800	-3.316	6.205	10.31	0.0570	835.1	95.2	6.51	0.711
0.900	-3.333	5.871	12.71	0.0637	842.5	98.2	6.65	0.719
0.950	-3.341	5.696	13.98	0.0820	847.8	99.8	6.72	0.724
1.000	-3.350	5.512	15.23	0.1249	857.3	101.8	6.77	0.732

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.880	21.733	26.533	658.0	65.13	1562.0	1.278	662.1	0.542
2	0.880	21.723	27.093	654.9	63.62	1549.6	1.275	693.8	0.571
3	0.881	21.716	27.532	652.0	62.41	1536.0	1.270	716.7	0.592
4	0.882	21.688	28.390	647.4	60.08	1510.7	1.259	758.9	0.632
5	0.883	21.632	28.940	643.7	58.23	1481.9	1.242	785.6	0.658
6	0.883	21.541	29.280	640.8	56.59	1450.7	1.221	804.0	0.677
7	0.884	21.413	29.380	638.3	55.15	1415.7	1.196	814.1	0.688
8	0.885	21.242	29.350	636.2	53.70	1378.6	1.167	821.3	0.696
9	0.886	21.014	29.280	634.4	52.04	1341.2	1.139	830.2	0.705
10	0.886	20.731	29.160	633.0	50.13	1302.6	1.109	840.5	0.715
11	0.886	20.408	28.920	631.6	48.07	1260.7	1.075	848.2	0.723
12	0.887	20.204	28.770	631.5	46.88	1240.3	1.059	853.7	0.729
13	0.887	19.900	28.564	632.3	45.45	1222.1	1.044	863.3	0.737

STA 22.000 MASS AVERAGED PROPERTIES
PT= 28.776 TT= 640.23 GAMMA=1.4002 PT-RAT= 1.958 TT-RAT= 1.234
RCU= 649.0 VM= 793.0 CZ= 786.0 MM=0.668 MABS=0.673 MREL=1.184

STATOR   I=24   STA= 23.000   TE STATOR
WTF= 61.365   OPTX=DPP   MTIP=300   AFLOW= 118.18   D+C=0.   D+H=0.
                 OPTY=BETM   ITYPE=3   INBR=4   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-2.567	8.500	0.	0.	651.5	0.	0.	0.533
0.050	-2.581	8.358	0.49	0.0062	678.5	0.	0.	0.557
0.100	-2.595	8.213	0.91	0.0089	696.1	0.	0.	0.574
0.200	-2.622	7.948	1.67	0.0120	738.2	0.	0.	0.614
0.300	-2.648	7.684	2.43	0.0177	764.1	0.	0.	0.639
0.400	-2.674	7.420	3.25	0.0260	782.7	0.	0.	0.657
0.500	-2.700	7.152	4.17	0.0370	792.7	0.	0.	0.668
0.600	-2.727	6.876	5.21	0.0497	798.8	0.	0.	0.675
0.700	-2.756	6.589	6.41	0.0647	807.6	0.	0.	0.684
0.800	-2.785	6.292	7.99	0.0931	827.6	0.	0.	0.703
0.900	-2.816	5.977	9.87	0.1246	827.3	0.	0.	0.704
0.950	-2.832	5.809	10.79	0.1318	827.1	0.	0.	0.704
1.000	-2.850	5.631	11.52	0.1267	815.1	0.	0.	0.692

SL	BLDBLK	PS	PT	TT	BETAM	VM	VREL	MREL	VABS	MABS
1	0.940	21.525	26.109	658.0	66.52	651.5	1635.4	1.337	651.5	0.533
2	0.940	21.526	26.581	654.9	65.30	678.5	1623.4	1.334	678.5	0.557
3	0.940	21.522	26.910	652.0	64.36	696.1	1608.7	1.327	696.1	0.574
4	0.940	21.507	27.731	647.4	62.24	738.2	1585.0	1.318	738.2	0.614
5	0.940	21.477	28.269	643.7	60.60	764.1	1556.5	1.301	764.1	0.639
6	0.940	21.425	28.638	640.8	59.13	782.7	1525.5	1.281	782.7	0.657
7	0.940	21.337	28.780	638.3	57.87	792.7	1490.5	1.256	792.7	0.668
8	0.940	21.204	28.769	636.2	56.64	798.8	1452.8	1.227	798.8	0.675
9	0.940	21.020	28.749	634.4	55.22	807.6	1415.8	1.199	807.6	0.684
10	0.940	20.735	28.851	633.0	53.30	827.6	1384.8	1.177	827.6	0.703
11	0.940	20.295	28.252	631.6	51.89	827.3	1340.5	1.140	827.3	0.704
12	0.940	20.015	27.861	631.5	51.10	827.1	1317.2	1.121	827.1	0.704
13	0.940	19.716	27.159	632.3	50.64	815.1	1285.3	1.091	815.1	0.692

STA 23.000   MASS AVERAGED PROPERTIES
PT= 28.163   TT= 640.23   GAMMA=1.4002   PT-RAT= 1.916   TT-RAT= 1.234
RCU= 0.   VM= 777.4   CZ= 773.2   MM=0.654   MABS=0.654   MREL=1.244

AVERAGE PCT IMM	RAD	BLADE SPEED IN	OUT	ACC PT RATIO	ACC TT RATIO	EFFICIENCY AD.	POLY	AXIAL VEL R
0.	8.500			1.7766	1.2686	0.665	0.691	1.206
4.7	8.341			1.8088	1.2626	0.703	0.727	1.164
9.3	8.188			1.8311	1.2570	0.734	0.756	1.135
18.0	7.894			1.8870	1.2481	0.802	0.819	1.110
26.5	7.608			1.9236	1.2410	0.853	0.866	1.099
35.0	7.322			1.9487	1.2354	0.893	0.902	1.096
43.7	7.029			1.9584	1.2306	0.919	0.926	1.097
52.9	6.723			1.9576	1.2266	0.935	0.941	1.100
62.5	6.398			1.9562	1.2231	0.948	0.953	1.109
73.0	6.046			1.9632	1.2204	0.965	0.968	1.137
84.8	5.649			1.9224	1.2177	0.944	0.949	1.150
91.6	5.419			1.8958	1.2175	0.923	0.929	1.189
100.0	5.137			1.8480	1.2190	0.876	0.887	1.161

EXIT

```
                    I=25        STA= 24.000    AFLOW= 116.57    D+C=0.          FREE
WTF= 61.365                     MTIP=313    OPTY=FREE  ITYPE=0  INBR=C  ABC=0.          D+H=0.
                    OPTX=DPP                                                            APH=0.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-2.000	8.500	0.	0.	668.7	0.	0.	0.548
0.050	-2.000	8.362	0.32	0.0039	695.2	0.	0.	0.572
0.100	-2.000	8.226	0.62	0.0079	712.5	0.	0.	0.589
0.200	-2.000	7.964	1.18	0.0157	754.6	0.	0.	0.628
0.300	-2.000	7.707	1.67	0.0231	781.5	0.	0.	0.655
0.400	-2.000	7.452	2.15	0.0309	801.4	0.	0.	0.675
0.500	-2.000	7.194	2.63	0.0398	812.9	0.	0.	0.687
0.600	-2.000	6.929	3.12	0.0505	820.3	0.	0.	0.695
0.700	-2.000	6.656	3.62	0.0640	830.7	0.	0.	0.705
0.800	-2.000	6.374	4.11	0.0789	850.3	0.	0.	0.725
0.900	-2.000	6.078	4.59	0.0994	846.8	0.	0.	0.722
0.950	-2.000	5.922	4.85	0.1149	844.4	0.	0.	0.720
1.000	-2.000	5.757	5.28	0.1260	831.1	0.	0.	0.707

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.950	21.296	26.109	658.0	65.97	1642.3	1.345	668.7	0.548
2	0.950	21.294	26.581	654.9	64.77	1631.1	1.342	695.2	0.572
3	0.950	21.286	26.910	652.0	63.86	1617.2	1.336	712.5	0.589
4	0.950	21.254	27.731	647.4	61.77	1595.1	1.328	754.6	0.628
5	0.950	21.197	28.269	643.7	60.12	1568.7	1.314	781.5	0.655
6	0.950	21.112	28.638	640.8	58.64	1540.1	1.296	801.4	0.675
7	0.950	20.995	28.780	638.3	57.37	1507.5	1.273	812.9	0.687
8	0.950	20.837	28.769	636.2	56.14	1472.5	1.247	820.3	0.695
9	0.950	20.624	28.749	634.4	54.73	1438.6	1.222	830.7	0.705
10	0.950	20.339	28.851	633.0	52.91	1410.0	1.202	850.3	0.725
11	0.950	19.960	28.252	631.6	51.71	1366.6	1.165	846.8	0.722
12	0.950	19.723	27.861	631.5	51.06	1343.5	1.146	844.4	0.720
13	0.950	19.454	27.159	632.3	50.71	1312.6	1.117	831.1	0.707

```
            STA  24.000  MASS AVERAGED PROPERTIES
PT= 28.163  TT= 640.23  GAMMA=1.4002  PT-RAT= 1.916  TT-RAT= 1.234
RCU=  0.    VM= 796.6   CZ= 795.5   MM=0.671  MABS=0.671  MREL=1.262
```

EXIT

STA= 25.000
I=26   MTIP=326   AFLOW= 116.27

FREE

WTF= 61.365   OPTX=DPP   OPTY=FREE   ITYPE=0   INBR=0

D+C=0.   D+H=0.
ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-1.270	8.500	0.	0.	685.8	0.	0.	0.562
0.050	-1.270	8.365	0.19	0.0025	711.4	0.	0.	0.586
0.100	-1.270	8.232	0.36	0.0048	728.0	0.	0.	0.602
0.200	-1.270	7.975	0.66	0.0091	768.2	0.	0.	0.641
0.300	-1.270	7.723	0.91	0.0135	793.2	0.	0.	0.665
0.400	-1.270	7.472	1.13	0.0179	810.9	0.	0.	0.683
0.500	-1.270	7.218	1.32	0.0227	819.5	0.	0.	0.693
0.600	-1.270	6.956	1.48	0.0279	823.0	0.	0.	0.697
0.700	-1.270	6.686	1.58	0.0334	827.8	0.	0.	0.703
0.800	-1.270	6.407	1.62	0.0397	839.6	0.	0.	0.715
0.900	-1.270	6.112	1.54	0.0463	824.5	0.	0.	0.701
0.950	-1.270	5.956	1.42	0.0493	813.9	0.	0.	0.691
1.000	-1.270	5.790	0.00	0.1263	794.2	0.	0.	0.673

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	21.067	26.109	658.0	65.43	1649.3	1.353	685.8	0.562
2	0.956	21.065	26.581	654.9	64.27	1638.6	1.350	711.4	0.586
3	0.956	21.060	26.910	652.0	63.38	1625.0	1.345	728.0	0.602
4	0.956	21.040	27.731	647.4	61.37	1603.3	1.337	768.2	0.641
5	0.956	21.005	28.269	643.7	59.80	1576.9	1.323	793.2	0.665
6	0.956	20.954	28.638	640.8	58.41	1548.0	1.304	810.9	0.683
7	0.956	20.884	28.780	638.3	57.24	1514.6	1.280	819.5	0.693
8	0.956	20.792	28.769	636.2	56.16	1477.9	1.252	823.0	0.697
9	0.956	20.674	28.749	634.4	54.95	1441.3	1.223	827.8	0.703
10	0.956	20.526	28.851	633.0	53.40	1408.3	1.199	839.6	0.715
11	0.956	20.342	28.252	631.6	52.61	1357.7	1.155	824.5	0.701
12	0.956	20.235	27.861	631.5	52.25	1329.4	1.129	813.9	0.691
13	0.956	20.052	27.159	632.3	52.15	1294.2	1.096	794.2	0.673

STA= 25.000   MASS AVERAGED PROPERTIES

TT= 640.23   GAMMA=1.4002   PT-RAT= 1.916   TT-RAT= 1.234
VM= 797.9   CZ= 797.7   MM=0.672   MABS=0.672   MREL=1.264

PT= 28.163
RCU= 0.

40

```
WTF= 61.365        STA= 26.000    AFLOW= 116.28    D*C=O.    D*H=O.      FREE
                   MTIP=339                        ABC=O.    ABH=O.
            I=27   OPTY=FREE  ITYPE=O  INBP=O
            OPTX=DPP
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-0.350	8.500	0.	0.	703.4		0.	0.578
0.050	-0.350	8.367	0.11	-0.0000	728.2	0.	0.	0.601
0.100	-0.350	8.237	0.21	-0.0000	743.9	0.	0.	0.617
0.200	-0.250	7.982	0.38	-0.0000	781.9	0.	0.	0.653
0.300	-0.350	7.733	0.49	-0.0000	804.2	0.	0.	0.675
0.400	-0.350	7.484	0.57	-0.0000	818.5	0.	0.	0.690
0.500	-0.350	7.231	0.62	-0.0000	823.0	0.	0.	0.696
0.600	-0.350	6.970	0.61	-0.0000	821.1	0.	0.	0.695
0.700	-0.350	6.700	0.55	-0.0000	819.2	0.	0.	0.695
0.800	-0.350	6.419	0.40	-0.0000	822.6	0.	0.	0.699
0.900	-0.350	6.121	0.12	-0.0000	796.0	0.	0.	0.675
0.950	-0.350	5.961	-0.10	-0.0000	778.3	0.	0.	0.659
1.000	-0.350	5.791	0.	0.	745.2	0.	0.	0.628

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	20.824	26.109	658.0	64.88	1656.8	1.361	703.4	0.578
2	0.956	20.824	26.581	654.9	63.75	1646.3	1.359	728.2	0.601
3	0.956	20.823	26.910	652.0	62.90	1632.8	1.353	743.9	0.617
4	0.956	20.823	27.731	647.4	60.97	1611.1	1.346	781.9	0.653
5	0.956	20.824	28.269	643.7	59.49	1584.0	1.330	804.2	0.675
6	0.956	20.824	28.638	640.8	58.21	1553.8	1.310	818.5	0.690
7	0.956	20.824	28.780	638.3	57.18	1518.4	1.284	823.0	0.696
8	0.956	20.824	28.769	636.2	56.28	1479.0	1.252	821.1	0.695
9	0.956	20.823	28.749	634.4	55.28	1438.4	1.220	819.2	0.695
10	0.956	20.822	28.851	633.0	54.01	1399.9	1.185	822.6	0.693
11	0.956	20.822	28.252	631.6	53.61	1341.8	1.137	796.0	0.675
12	0.956	20.822	27.861	631.5	53.50	1308.6	1.107	778.3	0.659
13	0.956	20.822	27.159	632.3	53.90	1264.7	1.066	745.2	0.628

```
                   STA  26.000  MASS AVERAGED PROPERTIES
            TT= 640.23  GAMMA=1.4002  PT-RAT= 1.916  TT-RAT= 1.234
       VM= 796.1   CZ= 796.1  MM=0.670  MABS=0.670  MREL=1.264
PT= 28.163
RCU=   0.
```

PHASE IV ROTOR

BLADE FORCES

THE FORCE CALCULATIONS ARE 'PER BLADE ROW'.
TO FIND THE FORCE ON A SINGLE BLADE, DIVIDE BY 'NB'

THE FORCES ARE THAT OF THE AIR ON THE BLADES.
POSITIVE AXIAL IS AFT; POSITIVE TANGENTIAL IS IN ROTATION DIRECTION.
THE COLUMNS HEADED BY F-TAN*, F-AXL*, AND F-RAD* ARE THE TANGENTIAL,
AXIAL, AND RADIAL FORCES PER INCH OF CHANGE IN R-AVG.

SL	R-AVG (IN.)	H-AVG (IN.)	F-TAN* (LB/IN)	F-AXL* (LB/IN)	F-RAD* (LB/IN)
1	8.500	0.	-289.5	-491.3	-34.1
2	8.317	0.183	-293.6	-402.9	-32.1
3	8.138	0.362	-298.4	-404.7	-28.0
4	7.781	0.719	-299.6	-400.7	-20.8
5	7.419	1.081	-296.9	-387.5	-9.4
6	7.041	1.459	-290.3	-367.9	2.5
7	6.640	1.860	-280.8	-339.8	-2.7
8	6.205	2.295	-269.9	-302.0	-18.3
9	5.726	2.774	-259.7	-259.1	-28.6
10	5.185	3.315	-244.2	-207.1	-30.0
11	4.525	3.975	-214.1	-135.4	-26.8
12	4.103	4.397	-186.9	-83.3	-27.4
13	3.547	4.953	-165.4	-46.4	-28.0

NET TORQUE= -7884.4 IN-LB
NET TAN. FORCE= -1262.7 LB
NET AXIAL FORCE= -1310.9 LB
NET RADIAL FORCE= -104.1 LB

2. STREAMSURFACE BLADE COORDINATES

Figure 66 shows the stacked Phase IV rotor streamsurface sections. Each page of the following tabulation gives the coordinates for one of these sections. The streamline designation for these sections corresponds to the calculation streamlines of the circumferential average flow calculation. Streamline 1 is at the casing and streamline 13 is at the hub. Also given in the tabulations are coordinates for the section meanline, the meanline angle, and the section thickness at each point. Streamsurface section chord, camber angle, and stagger angle are also given. All dimensions in this tabulation are in inches or degrees.
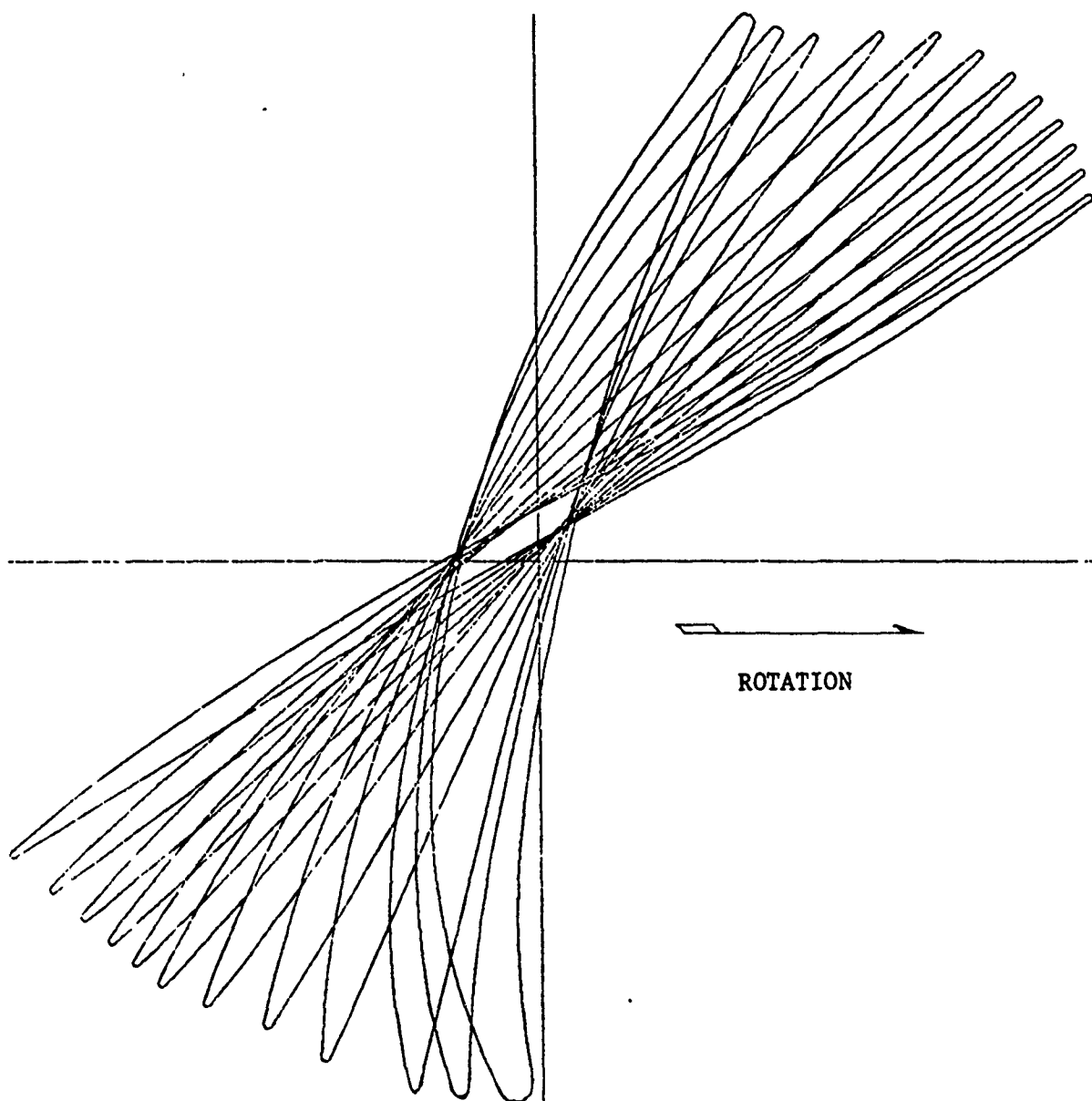
Figure __66__. **Stacked Phase IV Rotor Streamsurface Sections**

44

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 1

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.12800	8.50000	0.21035	-54.960	0.01884	0.	-1.12800	-54.960	0.01884
2	-1.07710	8.50000	0.20172	-55.530	0.02248	0.	-1.07710	-55.530	0.02248
3	-0.97530	8.50000	0.18391	-56.650	0.02990	0.	-0.97530	-56.650	0.02990
4	-0.87360	8.50000	0.16532	-57.786	0.03745	0.	-0.87360	-57.786	0.03745
5	-0.77180	8.50000	0.14588	-58.948	0.04507	0.	-0.77180	-58.948	0.04507
6	-0.65980	8.50000	0.12344	-60.229	0.05344	0.	-0.65980	-60.229	0.05344
7	-0.53770	8.50300	0.09762	-61.540	0.06245	0.	-0.53770	-61.540	0.06245
8	-0.41560	8.50000	0.07047	-62.612	0.07105	0.	-0.41560	-62.612	0.07105
9	-0.29340	8.50000	0.04234	-63.159	0.07889	0.	-0.29340	-63.159	0.07899
10	0.17130	8.50000	0.01397	-63.010	0.08554	0.	-0.17130	-63.010	0.08554
11	-0.04920	8.50000	-0.01388	-62.356	0.09068	0.	-0.04920	-62.356	0.09068
12	0.07290	8.50000	-0.04081	-61.454	0.09416	0.	0.07290	-61.454	0.09416
13	0.19510	8.50000	-0.06675	-60.585	0.09593	0.	0.19510	-60.585	0.09593
14	0.31720	8.50000	-0.09181	-59.753	0.09296	0.	0.31720	-59.753	0.09296
15	0.43930	8.50000	-0.11602	-58.872	0.09296	0.	0.43930	-58.872	0.09296
16	0.56150	8.50000	-0.13940	-57.962	0.08481	0.	0.56150	-57.962	0.08481
17	0.68360	8.50000	-0.16192	-56.924	0.06960	0.	0.68360	-56.924	0.06960
18	0.80570	8.50000	-0.18344	-55.525	0.04596	0.	0.80570	-55.525	0.04596
19	0.90750	8.50000	-0.20043	-54.104	0.01923	0.	0.90750	-54.104	0.01923

MEANLINE INPUT DATA - STREAMLINE 3

PT	Z	R	THETA	B*	T(Z)	PHI	Y	B*M	T(M)
1	-1.20400	8.14050	0.21625	-53.577	0.01946	0.815	-1.20406	-53.574	0.01946
2	-1.14850	8.14130	0.20691	-54.153	0.02352	0.814	-1.14855	-54.150	0.02352
3	-1.03750	8.14290	0.18765	-55.278	0.03178	0.785	-1.03754	-55.276	0.03178
4	-0.92650	8.14440	0.16756	-56.398	0.04017	0.676	-0.92653	-56.396	0.04017
5	-0.81550	8.14560	0.14661	-57.518	0.04858	0.492	-0.81553	-57.518	0.04858
6	-0.69340	8.14640	0.12250	-58.725	0.05775	0.278	-0.69342	-58.724	0.05775
7	-0.56020	8.14670	0.09498	-59.765	0.06742	0.047	-0.56022	-59.765	0.06742
8	-0.42700	8.14660	0.06663	-60.176	0.07637	-0.221	-0.42702	-60.176	0.07637
9	-0.29380	8.14590	0.03818	-59.951	0.08418	-0.490	-0.29387	-59.950	0.08418
10	-0.16060	8.14430	0.01029	-59.213	0.09053	-0.689	-0.16061	-59.211	0.09053
11	-0.02740	8.14250	-0.01662	-58.171	0.09521	-.737	-0.02740	-58.169	0.09522
12	0.10570	8.14090	-0.04240	-57.028	0.09817	-0.639	0.10571	-57.026	0.09817
13	0.23890	8.13950	-0.06710	-55.942	0.09939	-0.481	0.23891	-55.941	0.09939
14	0.37210	8.13860	-0.09085	-54.915	0.09867	-0.335	0.37212	-54.915	0.09867
15	0.50530	8.13800	-0.11371	-53.883	0.09461	-0.260	0.50532	-53.883	0.09461
16	0.63850	8.13740	-0.13572	-52.825	0.08547	-0.300	0.63852	-52.825	0.08547
17	0.77170	8.13660	-0.15689	-51.766	0.06979	-0.353	0.77172	-51.766	0.06979
18	0.90490	8.13590	-0.17730	-50.765	0.04631	-0.210	0.90492	-50.764	0.04631
19	1.01590	8.13540	-0.19377	-49.952	0.01997	0.022	1.01593	-49.952	0.01997

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 4

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.28340	7.76360	0.22304	-52.294	0.02006	1.832	-1.28375	-52.280	0.02007
2	-1.22380	7.76560	0.21301	-52.811	0.02481	1.834	-1.22412	-52.796	0.02482
3	-1.10450	7.76940	0.19239	-53.814	0.03442	1.829	-1.10476	-53.801	0.03443
4	-0.98520	7.77320	0.17102	-54.789	0.04411	1.793	-0.98540	-54.776	0.04412
5	-0.86590	7.7690	0.14889	-55.759	0.05377	1.706	-0.86604	-55.748	0.05379
6	-0.73460	7.78070	0.12358	-56.848	0.06420	1.525	-0.73469	-56.839	0.06422
7	-0.59150	7.78420	0.09489	-57.709	0.07509	1.242	-0.59155	-57.703	0.07510
8	-0.44830	7.78690	0.06573	-57.669	0.08479	0.931	-0.44832	-57.666	0.08500
9	-0.30520	7.78880	0.03710	-56.800	0.09343	0.652	-0.30521	-56.798	0.09343
10	-0.16200	7.79020	0.00971	-55.430	0.10010	0.446	-0.16200	-55.429	0.10010
11	-0.01890	7.79110	-0.01626	-54.016	0.10491	0.317	-0.01890	-54.016	0.10491
12	0.12430	7.79170	-0.04100	-52.824	0.10788	0.277	0.12430	-52.824	0.10788
13	0.26740	7.79240	-0.06478	-51.819	0.10898	0.339	0.26740	-51.818	0.10898
14	0.41060	7.79340	-0.08777	-50.924	0.10794	0.434	0.41061	-50.923	0.10794
15	0.55380	7.79460	-0.11004	-50.063	0.10319	0.474	0.55381	-50.062	0.10319
16	0.69690	7.79570	-0.13165	-49.206	0.09294	0.408	0.69692	-49.205	0.09294
17	0.84010	7.79670	-0.15261	-48.351	0.07559	0.363	0.84012	-48.350	0.07559
18	0.98320	7.79780	-0.17295	-47.516	0.04969	0.586	0.98322	-47.514	0.04969
19	1.10250	7.79880	-0.18945	-46.823	0.02062	0.922	1.10253	-46.819	0.02062

MEANLINE INPUT DATA - STREAMLINE 5

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.35810	7.36510	0.22850	-50.976	0.02034	3.221	-1.35994	-50.932	0.02036
2	-1.29480	7.36870	0.21780	-51.425	0.02611	3.274	-1.29654	-51.379	0.02614
3	-1.16810	7.37610	0.19590	-52.321	0.03777	3.362	-1.16962	-52.273	0.03781
4	-1.04130	7.38360	0.17329	-53.246	0.04946	3.401	-1.04260	-53.198	0.04952
5	-0.91460	7.39120	0.14993	-54.163	0.06107	2.376	-0.91568	-54.116	0.06114
6	-0.77520	7.39930	0.12339	-55.029	0.07352	3.279	-0.77604	-54.985	0.07360
7	-0.62320	7.40780	0.09373	-55.409	0.08631	3.085	-0.62381	-55.370	0.08639
8	-0.47110	7.41570	0.06428	-54.690	0.09770	2.797	-0.47150	-54.658	0.09778
9	-0.31900	7.42280	0.03606	-53.258	0.10721	2.484	-0.31924	-53.232	0.10727
10	-0.16700	7.42890	0.00937	-51.765	0.11464	2.227	-0.16712	-51.744	0.11469
11	-0.01490	7.43450	-0.01597	-50.414	0.11996	2.057	-0.01491	-50.396	0.12001
12	0.13720	7.43990	-0.04020	-49.287	0.12315	1.955	0.13728	-49.271	0.12319
13	0.28920	7.44490	-0.06356	-48.390	0.12415	1.866	0.28937	-48.375	0.12419
14	0.44130	7.44970	-0.08622	-47.585	0.12252	1.799	0.44155	-47.571	0.12255
15	0.59340	7.45450	-0.10823	-46.735	0.11649	1.763	0.59372	-46.722	0.11652
16	0.74540	7.45900	-0.12958	-45.884	0.10420	1.687	0.74579	-45.871	0.10422
17	0.89750	7.46350	-0.15030	-45.073	0.08393	1.669	0.89795	-45.061	0.08395
18	1.04960	7.46820	-0.17045	-44.307	0.05410	1.942	1.05013	-44.290	0.05412
19	1.17630	7.47230	-0.18693	-43.683	0.02096	2.326	1.17691	-43.660	0.02087

46

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE   G

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.42690	6.93960	0.23262	-49.825	0.02048	4.953	-1.43237	-49.720	0.02052
2	-1.36020	6.94550	0.22115	-50.247	0.02793	5.059	-1.36542	-50.137	0.02799
3	-1.22670	6.95760	0.19772	-51.078	0.04295	5.251	-1.23138	-50.960	0.04306
4	-1.09320	6.97000	0.17363	-51.901	0.05797	5.387	-1.09730	-51.778	0.05813
5	-0.95970	6.98270	0.14990	-52.623	0.07276	5.436	-0.96320	-52.498	0.07797
6	-0.81290	6.99680	0.12113	-53.084	0.08842	5.367	-0.81574	-52.963	0.08867
7	-0.65270	7.01170	0.09072	-52.862	0.10422	5.175	-0.65486	-52.750	0.10449
8	-0.49260	7.02580	0.06120	-51.554	0.11801	4.941	-0.49413	-51.450	0.11828
9	-0.33240	7.03930	0.03342	-49.756	0.12931	4.670	-0.33337	-49.662	0.12956
10	-0.17220	7.05210	0.00727	-48.286	0.13802	4.363	-0.17267	-48.203	0.13824
11	-0.01200	7.06380	-0.01765	-47.097	0.14411	4.081	-0.01203	-47.025	0.14431
12	0.14810	7.07470	-0.04158	-46.044	0.14750	3.867	0.14845	-45.979	0.14767
13	0.30830	7.08540	-0.06464	-45.062	0.14807	3.727	0.30901	-45.001	0.14823
14	0.46850	7.09580	-0.08691	-44.122	0.14502	3.612	0.46954	-44.065	0.14516
15	0.62860	7.10560	-0.10844	-43.214	0.13646	3.485	0.62994	-43.162	0.13658
16	0.78880	7.11510	-0.12928	-42.342	0.12056	3.390	0.79043	-42.292	0.12066
17	0.94900	7.12460	-0.14949	-41.509	0.09560	3.437	0.95091	-41.457	0.09568
18	1.10920	7.13470	-0.16909	-40.712	0.05996	3.755	1.11142	-40.651	0.06001
19	1.24260	7.14330	-0.18499	-40.059	0.02102	4.156	1.24514	-39.984	0.02104

MEANLINE INPUT DATA - STREAMLINE

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.49240	6.47850	0.23543	-48.905	0.02013	6.980	-1.50436	-48.693	0.02021
2	-1.42250	6.48740	0.22298	-49.305	0.02995	7.131	-1.43393	-49.085	0.03008
3	-1.28280	6.50530	0.19763	-50.033	0.04972	7.402	-1.29309	-49.797	0.04996
4	-1.14300	6.52370	0.17177	-50.577	0.06937	7.581	-1.15209	-50.330	0.06973
5	-1.00330	6.54240	0.14560	-50.851	0.08852	7.645	-1.01114	-50.600	0.08899
6	-0.84960	6.56310	0.11680	-50.743	0.10850	7.601	-0.85607	-50.495	0.10907
7	-0.68190	6.58540	0.08595	-49.970	0.12833	7.439	-0.68691	-49.731	0.12897
8	-0.51420	6.60690	0.05647	-48.352	0.14543	7.192	-0.51783	-48.127	0.14607
9	-0.34650	6.62770	0.02892	-46.460	0.15934	6.921	-0.34885	-46.251	0.15995
10	-0.17880	6.64770	0.00304	-44.981	0.16995	6.666	-0.17997	-44.786	0.17053
11	-0.01110	6.66690	-0.02158	-43.704	0.17719	6.393	-0.01117	-43.526	0.17772
12	0.15650	6.68520	-0.04507	-42.463	0.18092	6.119	0.15743	-42.300	0.18139
13	0.32420	6.70280	-0.06753	-41.324	0.18095	5.913	0.32606	-41.172	0.18137
14	0.49190	6.71990	-0.08910	-40.303	0.17610	5.767	0.49463	-40.160	0.17647
15	0.65960	6.73670	-0.10989	-39.371	0.16433	5.662	0.66317	-39.234	0.16465
16	0.82730	6.75310	-0.12997	-38.462	0.14366	5.622	0.83169	-38.329	0.14393
17	0.99500	6.76960	-0.14935	-37.548	0.11226	5.729	1.00021	-37.409	0.11247
18	1.16770	6.78700	-0.16805	-36.640	0.06836	6.086	1.16890	-36.485	0.06850
19	1.30240	6.80200	-0.18314	-35.881	0.02110	6.507	1.30934	-35.706	0.02115

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 8

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.55210	5.97040	0.23707	-48.026	0.01915	9.300	-1.57450	-47.649	0.01929
2	-1.47940	5.98270	0.22349	-48.284	0.03177	9.492	-1.50082	-47.891	0.03201
3	-1.33410	6.00750	0.19607	-48.715	0.05705	9.830	-1.35342	-48.294	0.05753
4	-1.18870	6.03290	0.16846	-48.906	0.08195	10.038	-1.20580	-48.467	0.08267
5	-1.04340	6.05900	0.14096	-48.712	0.10599	10.091	-1.05623	-48.269	0.10692
6	-0.88350	6.08750	0.11135	-47.883	0.13069	10.016	-0.89583	-47.445	0.13179
7	-0.70910	6.11800	0.08058	-46.219	0.15471	9.838	-0.71877	-45.794	0.15590
8	-0.53470	6.14790	0.05200	-43.985	0.17501	9.625	-0.54183	-43.580	0.17620
9	-0.36030	6.17720	0.02574	-41.792	0.19130	9.411	-0.36499	-41.407	0.19245
10	-0.18590	6.20570	0.00129	-40.203	0.20349	9.207	-0.18827	-39.837	0.20458
11	-0.01150	6.23370	-0.02188	-38.956	0.21148	8.993	-0.01164	-38.609	0.21251
12	0.16290	6.26100	-0.04399	-37.803	0.21507	8.764	0.16487	-37.477	0.21601
13	0.33730	6.28750	-0.06513	-36.699	0.21388	8.538	0.34128	-36.394	0.21473
14	0.51180	6.31330	-0.08536	-35.628	0.20640	8.356	0.51769	-35.339	0.20714
15	0.68620	6.33870	-0.10474	-34.575	0.19064	8.270	0.69394	-34.296	0.19128
16	0.86060	6.36390	-0.12330	-33.523	0.16472	8.345	0.87018	-33.243	0.16525
17	1.03500	6.38970	-0.14105	-32.461	0.12689	8.603	1.04650	-32.168	0.12730
18	1.20940	6.41690	-0.15802	-31.383	0.07546	9.013	1.22297	-31.068	0.07571
19	1.35470	6.44030	-0.17157	-30.466	0.02109	9.417	1.37017	-30.128	0.02116

MEANLINE INPUT DATA - STREAMLINE 9

PT	Z	R	THETA	B*	T(Z)	PHI	X	R*M	T(M)
1	-1.59030	5.39730	0.23545	-46.823	0.01860	12.323	-1.62953	-46.156	0.01883
2	-1.51530	5.41430	0.22067	-46.817	0.03407	12.509	-1.55274	-46.129	0.03450
3	-1.36530	5.44830	0.19128	-46.739	0.06480	12.820	-1.39899	-46.017	0.06566
4	-1.21540	5.48260	0.16224	-46.464	0.09478	12.952	-1.24520	-45.776	0.09606
5	-1.06540	5.51710	0.13384	-45.749	0.12340	12.903	-1.09130	-45.016	0.12501
6	-0.90040	5.55480	0.10406	-44.014	0.15241	12.787	-0.92206	-43.295	0.15424
7	-0.72050	5.59540	0.07431	-41.242	0.18017	12.667	-0.73763	-40.543	0.18208
8	-0.54050	5.63560	0.04745	-38.786	0.20336	12.533	-0.55319	-38.113	0.20527
9	-0.36050	5.67540	0.02277	-36.868	0.22188	12.380	-0.36885	-36.223	0.22374
10	-0.18060	5.71470	-0.00020	-35.165	0.23555	12.211	-0.18472	-34.550	0.23732
11	-0.00060	5.75330	-0.02168	-33.622	0.24407	12.046	-0.00061	-33.037	0.24572
12	0.17930	5.79140	-0.04184	-32.178	0.24715	11.899	0.18329	-31.620	0.24865
13	0.35930	5.82910	-0.06079	-30.728	0.24423	11.776	0.36720	-30.195	0.24557
14	0.53930	5.86650	-0.07858	-29.343	0.23374	11.689	0.55103	-28.833	0.23490
15	0.71920	5.90360	-0.09533	-28.115	0.21389	11.680	0.73473	-27.620	0.21487
16	0.89920	5.94080	-0.11117	-26.937	0.18298	11.868	0.91859	-26.440	0.18378
17	1.07910	5.97900	-0.12613	-25.759	0.13936	12.236	1.10254	-25.247	0.13995
18	1.25910	6.01890	-0.14024	-24.629	0.08140	12.623	1.28686	-24.102	0.08174
19	1.40910	6.05310	-0.15139	-23.706	0.02102	12.933	1.44067	-23.169	0.02111

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 10

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.56520	4.73540	0.22870	-45.583	0.02076	16.169	-1.63112	-44.427	0.02118
2	-1.48910	4.75810	0.21238	-45.433	0.03875	16.322	-1.55185	-44.254	0.03955
3	-1.33690	4.80350	0.18031	-44.917	0.07436	16.573	-1.39315	-43.702	0.07592
4	-1.18470	4.84890	0.14941	-43.755	0.10879	16.659	-1.23430	-42.529	0.11099
5	-1.03250	4.89420	0.12042	-41.858	0.14117	16.5?1	-1.07546	-40.650	0.14380
6	-0.86500	4.94400	0.09122	-39.323	0.17356	16.486	-0.90073	-38.149	0.17644
7	-0.68240	4.99800	0.06260	-36.530	0.20445	16.377	-0.71035	-35.402	0.20739
8	-0.49970	5.05140	0.03685	-34.158	0.23028	16.711	-0.52000	-33.087	0.23316
9	-0.31710	5.10410	0.01338	-32.084	0.25072	16.062	-0.3299?	-31.067	0.25347
10	-0.13440	5.15660	-0.00806	-30.012	0.26539	16.015	-0.13983	-29.039	0.26795
11	0.04830	5.20900	-0.02761	-28.046	0.27389	16.026	0.05025	-27.114	0.27623
12	0.23090	5.26150	-0.04548	-26.220	0.27584	16.065	0.24025	-25.337	0.27793
13	0.41360	5.31420	-0.06183	-24.420	0.27049	16.132	0.43041	-23.565	0.27229
14	0.59620	5.36710	-0.07672	-22.644	0.25644	16.224	0.62053	-21.828	0.25794
15	0.77890	5.42050	-0.09025	-20.917	0.23227	16.374	0.81087	-20.138	0.23346
16	0.96150	5.47450	-0.10250	-19.184	0.19657	16.703	1.00134	-18.430	0.19745
17	1.14420	5.52980	-0.11348	-17.440	0.14801	17.118	1.19230	-16.711	0.14859
18	1.32680	5.58680	-0.12327	-15.735	0.08520	17.356	1.38351	-15.051	0.08548
19	1.47910	5.63520	-0.13056	-14.318	0.02103	17.443	1.54311	-13.685	0.02109

MEANLINE INPUT DATA - STREAMLINE 11

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.50840	3.90540	0.22113	-42.927	0.02534	21.651	-1.62321	-40.844	0.02619
2	-1.43310	3.93600	0.20338	-42.537	0.04357	21.825	-1.54214	-40.423	0.04502
3	-1.28240	3.99720	0.16909	-41.555	0.07963	22.096	-1.37964	-39.397	0.08223
4	-1.13180	4.05840	0.13676	-40.007	0.11465	22.144	-1.21705	-37.861	0.11817
5	-0.98120	4.11950	0.10696	-37.820	0.14793	21.986	-1.05453	-35.746	0.15199
6	-0.81550	4.18610	0.07749	-35.010	0.18172	21.772	-0.87598	-33.044	0.18598
7	-0.63470	4.25800	0.04924	-31.798	0.21456	21.576	-0.68142	-29.965	0.21870
8	-0.45390	4.32900	0.02471	-28.655	0.24270	21.384	-0.48713	-26.969	0.24650
9	-0.27320	4.39950	0.00345	-25.702	0.26570	21.260	-0.29317	-24.159	0.26905
10	-0.09240	4.46960	-0.01498	-22.996	0.28315	21.271	-0.09917	-21.577	0.28604
11	0.08830	4.54010	-0.03100	-20.541	0.29470	21.413	0.09482	-19.231	0.29715
12	0.26910	4.61140	-0.04489	-18.188	0.29997	21.683	0.28919	-16.977	0.30198
13	0.44990	4.68380	-0.05675	-15.677	0.29838	22.081	0.48401	-14.578	0.29993
14	0.63060	4.75790	-0.06658	-13.111	0.28786	22.588	0.67936	-12.136	0.28896
15	0.81140	4.83420	-0.07450	-10.653	0.26561	23.194	0.87560	-9.810	0.26632
16	0.99220	4.91310	-0.08067	-8.210	0.22883	23.913	1.07983	-7.514	0.22921
17	1.17290	4.99430	-0.08512	-5.624	0.17473	24.468	1.27098	-5.121	0.17487
18	1.35370	5.07700	-0.08776	-2.747	0.10058	24.402	1.46965	-2.502	0.10060
19	1.50430	5.14630	-0.08852	-0.167	0.07160	24.022	1.63479	-0.152	0.02160

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 12

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.48860	3.36160	0.22120	-41.159	0.03327	25.911	-1.64796	-38.178	0.03474
2	-1.41480	3.39830	0.20233	-40.564	0.05424	25.969	-1.56589	-37.581	0.05658
3	-1.26740	3.47110	0.16644	-39.168	0.09573	26.001	-1.40189	-36.212	0.09963
4	-1.12000	3.54270	0.13326	-37.285	0.13583	25.789	-1.23801	-34.432	0.14081
5	-0.97250	3.61290	0.10317	-34.893	0.17360	25.398	-1.07446	-32.212	0.17907
6	-0.81030	3.68920	0.07378	-32.054	0.21140	25.102	-0.89516	-29.555	0.21697
7	-0.63340	3.77200	0.04587	-28.978	0.24716	25.034	-0.69988	-26.647	0.25252
8	-0.45350	3.85450	0.02170	-25.926	0.27645	25.051	-0.50464	-23.769	0.28131
9	-0.27960	3.93720	0.00107	-22.918	0.29844	25.144	-0.30931	-20.943	0.30261
10	-0.10260	4.02050	-0.01641	-20.023	0.31232	25.361	-0.11362	-18.227	0.31573
11	0.07430	4.10490	-0.03114	-17.379	0.31731	25.681	0.08239	-15.752	0.32000
12	0.25120	4.19060	-0.04349	-14.881	0.31283	26.135	0.27903	-13.418	0.31485
13	0.42810	4.27850	-0.05356	-12.184	0.29910	26.787	0.47661	-10.910	0.30046
14	0.60510	4.36290	-0.06137	-9.408	0.27635	27.526	0.67554	-8.359	0.27714
15	0.78200	4.46290	-0.06703	-6.594	0.24465	28.252	0.87568	-5.814	0.24501
16	0.95890	4.55990	-0.07038	-2.969	0.20421	29.071	1.07728	-2.596	0.20427
17	1.13580	4.65920	-0.07087	1.629	0.15510	29.637	1.28035	1.416	0.15512
18	1.31280	4.75970	-0.06820	6.541	0.09749	29.260	1.48377	5.712	0.09764
19	1.46020	4.84390	-0.06355	10.688	0.04315	28.434	1.65209	9.424	0.04332

MEANLINE INPUT DATA - STREAMLINE 13

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.46880	2.65330	0.23827	-36.560	0.05041	31.199	-1.68772	-32.388	0.05300
2	-1.39810	2.69470	0.21880	-36.136	0.06912	30.603	-1.60533	-32.148	0.07246
3	-1.25660	2.77680	0.18168	-35.157	0.10653	29.513	-1.44187	-31.505	0.11109
4	-1.11510	2.85610	0.14705	-33.934	0.14307	28.724	-1.27994	-30.542	0.14851
5	-0.97360	2.93290	0.11508	-32.353	0.17792	28.302	-1.11895	-29.150	0.18394
6	-0.81790	3.01620	0.08332	-30.025	0.21366	28.181	-0.94226	-26.995	0.21989
7	-0.64810	3.10760	0.05320	-26.879	0.24875	28.431	-0.74946	-24.024	0.25472
8	-0.47830	3.20060	0.02781	-23.606	0.27874	29.100	-0.55582	-20.900	0.28418
9	-0.30850	3.29700	0.00660	-20.610	0.30281	30.104	-0.36057	-18.022	0.30764
10	-0.13870	3.39790	-0.01119	-18.079	0.32014	31.281	-0.16311	-15.588	0.32438
11	0.03110	3.50340	-0.02616	-15.758	0.32993	32.389	0.03679	-13.403	0.33348
12	0.20090	3.61310	-0.03855	-13.254	0.33123	33.335	0.23897	-11.133	0.33389
13	0.37070	3.72660	-0.04819	-10.127	0.32357	34.186	0.44323	-8.404	0.32516
14	0.54050	3.84380	-0.05466	-6.093	0.30692	35.003	0.64950	-4.997	0.30749
15	0.71030	3.96430	-0.05743	-0.985	0.28111	35.786	0.85782	-0.799	0.28112
16	0.88010	4.08010	-0.05595	5.212	0.24577	36.379	1.06799	4.200	0.24613
17	1.04990	4.21400	-0.04973	12.158	0.20093	36.561	1.27927	9.817	0.20253
18	1.21970	4.33860	-0.03857	19.209	0.14739	36.136	1.49021	15.716	0.15024
19	1.36120	4.44150	-0.02549	24.909	0.09632	35.488	1.66473	20.712	0.09934

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 1

NB 20

MEANLINE DATA

PT	PCT X	X	Y	B*M	T(M)
1	0.	-1.12800	1.78797	-54.960	0.01884
2	0.02500	-1.07711	1.71453	-55.530	0.02248
3	0.05000	-1.02623	1.63972	-56.090	0.02617
4	0.07500	-0.97534	1.56321	-56.650	0.02990
5	0.10000	-0.92445	1.48505	-57.215	0.03366
6	0.12500	-0.87356	1.40517	-57.786	0.03745
7	0.15000	-0.82268	1.32350	-58.364	0.04126
8	0.17500	-0.77179	1.23994	-58.948	0.04507
9	0.20000	-0.72090	1.15444	-59.533	0.04888
10	0.23000	-0.65984	1.04917	-60.228	0.05344
11	0.26000	-0.59877	0.94093	-60.902	0.05797
12	0.29000	-0.53771	0.82974	-61.540	0.06245
13	0.32000	-0.47664	0.71567	-62.123	0.06682
14	0.35000	-0.41557	0.59897	-62.613	0.07105
15	0.38000	-0.35451	0.48013	-62.969	0.07509
16	0.41000	-0.29344	0.35988	-63.159	0.07889
17	0.44000	-0.23238	0.23911	-63.164	0.08239
18	0.47000	-0.17131	0.11875	-63.010	0.08554
19	0.50000	-0.11025	-0.00047	-62.731	0.08831
20	0.53000	-0.04918	-0.11803	-62.356	0.09068
21	0.56000	0.01188	-0.23356	-61.916	0.09264
22	0.59000	0.07295	-0.34690	-61.454	0.09416
23	0.62000	0.13401	-0.45841	-61.009	0.09525
24	0.65000	0.19508	-0.56736	-60.585	0.09593
25	0.68000	0.25614	-0.67476	-60.171	0.09620
26	0.71000	0.31721	-0.78037	-59.753	0.09593
27	0.74000	0.37827	-0.88420	-59.318	0.09494
28	0.77000	0.43934	-0.98621	-58.872	0.09296
29	0.80000	0.50040	-1.08644	-58.422	0.08967
30	0.83000	0.56147	-1.18491	-57.962	0.08481
31	0.86000	0.62253	-1.28159	-57.475	0.07816
32	0.89000	0.68360	-1.37637	-56.924	0.06960
33	0.92000	0.74466	-1.46901	-56.273	0.05900
34	0.95000	0.80573	-1.55923	-55.524	0.04595
35	0.97500	0.85661	-1.63241	-54.636	0.03310
36	1.00000	0.90750	-1.70368	-54.104	0.01923

SURFACE COORDINATES

PT	XS	YS	XP	YP
1	-1.12800	1.78797	-1.12800	1.78797
2	-1.13201	1.78140	-1.12031	1.78946
3	-1.13047	1.77475	-1.11473	1.78577
4	-1.08638	1.70827	-1.06785	1.72079
5	-1.03708	1.63242	-1.01537	1.64702
6	-0.98782	1.55499	-0.96285	1.57143
7	-0.93860	1.47594	-0.91030	1.49417
8	-0.88941	1.39519	-0.85772	1.41516
9	-0.84024	1.31268	-0.80511	1.33432
10	-0.79109	1.22832	-0.75248	1.25157
11	-0.74196	1.14205	-0.69984	1.16633
12	-0.68303	1.03590	-0.63664	1.06243
13	-0.62410	0.92684	-0.57344	0.95503
14	-0.56516	0.81486	-0.51025	0.84462
15	-0.50617	0.70005	-0.44711	0.73129
16	-0.44712	0.58263	-0.38403	0.61571
17	-0.38795	0.46307	-0.32107	0.49720
18	-0.32864	0.34207	-0.25825	0.37769
19	-0.26914	0.22052	-0.19562	0.25771
20	-0.20943	0.09934	-0.13320	0.13816
21	-0.14950	-0.02070	-0.07100	0.01976
22	-0.08935	-0.13907	-0.00902	-0.09699
23	-0.02898	-0.25536	0.05274	-0.21175
24	0.03159	-0.36940	0.11430	-0.32440
25	0.09235	-0.48120	0.17567	-0.43503
26	0.15329	-0.59092	0.23686	-0.54380
27	0.21441	-0.69868	0.29787	-0.65083
28	0.27577	-0.80453	0.35864	-0.75621
29	0.33744	-0.90842	0.41910	-0.85997
30	0.39955	-1.01024	0.47912	-0.96219
31	0.46220	-1.10992	0.53860	-1.06296
32	0.52552	-1.20740	0.59741	-1.16241
33	0.58958	-1.30260	0.65548	-1.26058
34	0.65443	-1.39536	0.71276	-1.35738
35	0.72013	-1.48539	0.76919	-1.45263
36	0.78678	-1.57724	0.82467	-1.54622
37	0.84308	-1.64194	0.87014	-1.62288
38	0.89346	-1.70199	0.91031	-1.68983
39	0.89943	-1.70547	0.91170	-1.69680
40	0.90750	-1.70368	0.90750	-1.70368

CHORD 4.04165   CAMBER 0.856   STAGGER -59.759

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 3

NR 20

| | | MEANLINE DATA | | | | | SURFACE COORDINATES | | | |
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	YP	YP
1	0	-1.20406	1.76155	-53.574	0.01946	1	-1.20406	1.76155	-1.20406	1.76155
2	0.02500	-1.14856	1.68554	-54.150	0.02352	2	-1.20804	1.75466	-1.19614	1.76328
3	0.05000	-1.09306	1.60792	-54.715	0.02763	3	-1.20629	1.74783	-1.19029	1.75961
4	0.07500	-1.03756	1.52867	-55.276	0.03178	4	-1.15809	1.67866	-1.13903	1.69243
5	0.10000	-0.98206	1.44775	-55.836	0.03597	5	-1.10434	1.59995	-1.08178	1.61590
6	0.12500	-0.92656	1.36511	-56.396	0.04017	6	-1.05062	1.51962	-1.02450	1.53773
7	0.15000	-0.87106	1.28070	-56.956	0.04438	7	-0.99694	1.43765	-0.96718	1.45785
8	0.17500	-0.81556	1.19445	-57.517	0.04858	8	-0.94329	1.35399	-0.90983	1.37623
9	0.20000	-0.76006	1.10633	-58.077	0.05277	9	-0.88966	1.26860	-0.85246	1.29279
10	0.23000	-0.69346	0.99805	-58.724	0.05775	10	-0.83605	1.18141	-0.79507	1.20750
11	0.26000	-0.62686	0.88711	-59.306	0.06265	11	-0.78245	1.09238	-0.73767	1.12028
12	0.29000	-0.56026	0.77382	-59.765	0.06742	12	-0.71814	0.98306	-0.66878	1.01304
13	0.32000	-0.49486	0.65882	-60.055	0.07201	13	-0.65380	0.87112	-0.59993	0.90310
14	0.35000	-0.42706	0.54286	-60.176	0.07637	14	-0.58939	0.75685	-0.53114	0.79080
15	0.38000	-0.36046	0.42672	-60.136	0.08044	15	-0.52486	0.64084	-0.46247	0.67679
16	0.41000	-0.29387	0.31111	-59.950	0.08418	16	-0.46019	0.52387	-0.39394	0.56185
17	0.44000	-0.22727	0.19667	-59.633	0.08756	17	-0.39534	0.40669	-0.32559	0.44674
18	0.47000	-0.16067	0.08392	-59.211	0.09053	18	-0.33030	0.29003	-0.25743	0.33218
19	0.50000	-0.09407	-0.02678	-58.716	0.09309	19	-0.26504	0.17454	-0.18949	0.21880
20	0.53000	-0.02747	-0.13524	-58.170	0.09521	20	-0.19955	0.06075	-0.12178	0.10709
21	0.56000	0.03913	-0.24135	-57.599	0.09691	21	-0.13384	-0.05095	-0.05429	-0.00261
22	0.59000	0.10573	-0.34514	-57.026	0.09817	22	-0.06791	-0.16034	0.01298	-0.11013
23	0.62000	0.17233	-0.44671	-56.473	0.09900	23	-0.00178	-0.26731	0.08004	-0.21538
24	0.65000	0.23893	-0.54622	-55.941	0.09939	24	0.06455	-0.37185	0.14691	-0.31842
25	0.68000	0.30553	-0.64379	-55.425	0.09934	25	0.13107	-0.47405	0.21359	-0.41937
26	0.71000	0.37213	-0.73950	-54.915	0.09867	26	0.19776	-0.57405	0.28010	-0.51839
27	0.74000	0.43873	-0.83342	-54.402	0.09717	27	0.26463	-0.67197	0.34643	-0.61560
28	0.77000	0.50533	-0.92557	-53.883	0.09461	28	0.33176	-0.76786	0.41250	-0.71115
29	0.80000	0.57193	-1.01597	-53.356	0.09078	29	0.39923	-0.86170	0.47823	-0.80514
30	0.83000	0.63853	-1.10465	-52.825	0.08547	30	0.46712	-0.95346	0.54354	-0.89769
31	0.86000	0.70513	-1.19163	-52.291	0.07850	31	0.53551	-1.04306	0.60835	-0.98888
32	0.89000	0.77173	-1.27695	-51.766	0.06979	32	0.60448	-1.13047	0.67258	-1.07883
33	0.92000	0.83833	-1.36071	-51.258	0.05921	33	0.67408	-1.21563	0.73618	-1.16762
34	0.95000	0.90493	-1.44299	-50.764	0.04631	34	0.74432	-1.29855	0.79914	-1.25536
35	0.97500	0.96043	-1.51046	-50.358	0.03363	35	0.81524	-1.37924	0.86142	-1.34219
36	1.00000	1.01593	-1.57697	-49.952	0.01997	36	0.88699	-1.45764	0.92286	-1.42834
						37	0.94748	-1.52119	0.97337	-1.49973
						38	1.00126	-1.57628	1.01778	-1.56242
						39	1.00775	-1.57944	1.01975	-1.56949
						40	1.01593	-1.57697	1.01593	-1.57697

CHORD 4.00925   CAMBER 3.622   STAGGER -56.378

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 4

NB 20

MEANLINE DATA

PT	PCT X	X	Y	B+M	T(M)
1	0.0	-1.28375	1.73528	-52.280	0.02007
2	0.02500	-1.22409	1.65742	-52.797	0.02482
3	0.05000	-1.16444	1.57811	-53.303	0.02961
4	0.07500	-1.10478	1.49733	-53.800	0.03443
5	0.10000	-1.04512	1.41508	-54.291	0.03927
6	0.12500	-0.98547	1.33134	54.775	0.04412
7	0.15000	-0.92581	1.24608	-55.257	0.04896
8	0.17500	-0.86615	1.15928	-55.747	0.05378
9	0.20000	-0.80649	1.07084	-56.249	0.05855
10	0.23000	-0.73491	0.96249	-56.837	0.06420
11	0.26000	-0.66332	0.85181	-57.354	0.06973
12	0.29000	-0.59173	0.73923	-57.703	0.07509
13	0.32000	-0.52014	0.62566	-57.804	0.08019
14	0.35000	-0.44855	0.51219	-57.667	0.08498
15	0.38000	-0.37696	0.39977	-57.319	0.08941
16	0.41000	-0.30537	0.28923	-56.799	0.09343
17	0.44000	-0.23379	0.18114	-56.150	0.09699
18	0.47000	-0.16220	0.07582	-55.431	0.10009
19	0.50000	-0.09061	-0.02668	-54.706	0.10273
20	0.53000	-0.01902	-0.12652	-54.017	0.10491
21	0.56000	0.05257	-0.22398	-53.391	0.10563
22	0.59000	0.12416	-0.31934	-52.875	0.10788
23	0.62000	0.19575	-0.41284	-52.304	0.10866
24	0.65000	0.26733	-0.50466	-51.813	0.10898
25	0.68000	0.33892	-0.59495	-51.362	0.10881
26	0.71000	0.41051	-0.68380	-50.923	0.10794
27	0.74000	0.48210	-0.77129	-50.491	0.10615
28	0.77000	0.55369	-0.85745	-50.063	0.10320
29	0.80000	0.62528	-0.94231	-49.634	0.09887
30	0.83000	0.69687	-1.02589	-49.205	0.09295
31	0.86000	0.76845	-1.10822	-48.777	0.08522
32	0.89000	0.84004	-1.18932	-48.351	0.07560
33	0.92000	0.91163	-1.26922	-47.930	0.06392
34	0.95000	0.98322	-1.34795	-47.514	0.04969
35	0.97500	1.04288	-1.41270	-47.168	0.03570
36	1.00000	1.10253	-1.47666	-46.819	0.02062

SURFACE COORDINATES

PT	XS	YS	XP	YP
1	-1.28375	1.73528	-1.28375	1.73528
2	-1.28771	1.72807	-1.27563	1.73726
3	-1.28576	1.72106	-1.26049	1.73362
4	-1.23398	1.64992	-1.21421	1.66492
5	-1.17631	1.56926	-1.15257	1.58695
6	-1.11867	1.48716	-1.09089	1.50749
7	-1.06107	1.40362	-1.02918	1.42654
8	-1.00349	1.31861	-0.96745	1.34406
9	-0.94592	1.23213	-0.90569	1.26004
10	-0.88838	1.14414	-0.84393	1.17441
11	-0.83084	1.05458	-0.78215	1.08710
12	-0.76178	0.94493	-0.70803	0.98005
13	-0.69268	0.83300	-0.63396	0.87062
14	-0.62347	0.71917	-0.55939	0.75929
15	-0.55407	0.60430	-0.48621	0.64703
16	-0.48446	0.48946	-0.41265	0.53491
17	-0.41459	0.37563	-0.33934	0.42391
18	-0.34446	0.26365	-0.26629	0.31481
19	-0.27406	0.15412	-0.19351	0.20815
20	-0.20341	0.04742	-0.12099	0.10421
21	-0.13253	-0.05636	-0.04868	-0.00299
22	-0.06147	-0.15734	0.02342	-0.09570
23	0.00977	-0.25577	0.09536	-0.19218
24	0.08118	-0.35193	0.16714	-0.28674
25	0.15276	-0.44606	0.23873	-0.37962
26	0.22450	-0.53835	0.31017	-0.47098
27	0.29643	-0.62892	0.38142	-0.56098
28	0.36861	-0.71783	0.45241	-0.64978
29	0.44115	-0.80506	0.52305	-0.73753
30	0.51412	-0.89058	0.59325	-0.82433
31	0.58761	-0.97433	0.66294	-0.91029
32	0.66168	-1.05626	0.73205	-0.94553
33	0.73640	-1.13630	0.80050	-1.08014
34	0.81180	-1.21444	0.86829	-1.16420
35	0.88790	-1.29063	0.93536	-1.24780
36	0.96490	-1.36474	1.00154	-1.33117
37	1.02979	-1.42483	1.05597	-1.40056
38	1.08733	-1.47683	1.10369	-1.46150
39	1.09423	-1.47969	1.10609	-1.46869
40	1.10253	-1.47666	1.10253	-1.47666

CHORD 4.00136   CAMBER 5.460   STAGGER -53.390

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 5

NR 20

------- MEANLINE DATA -------

PT	PCT X	X	Y	B*M	T(M)
1	0.	-1.35994	1.69094	-50.932	0.02036
2	0.02500	-1.29652	1.61218	-51.379	0.02614
3	0.05000	-1.23310	1.53216	-51.824	0.03196
4	0.07500	-1.16967	1.45084	-52.273	0.03781
5	0.10000	-1.10625	1.36818	-52.731	0.04365
6	0.12500	-1.04283	1.28413	-53.196	0.04949
7	0.15000	-0.97941	1.19854	-53.660	0.05532
8	0.17500	-0.91599	1.11171	-54.113	0.06111
9	0.20000	-0.85257	1.02335	-54.541	0.06683
10	0.23000	-0.77646	0.91558	-54.983	0.07356
11	0.26000	-0.70036	0.80627	-55.291	0.08010
12	0.29000	-0.62425	0.69614	-55.371	0.08636
13	0.32000	-0.54815	0.58630	-55.146	0.09226
14	0.35000	-0.47204	0.47792	-54.662	0.09774
15	0.38000	-0.39593	0.37184	-53.995	0.10274
16	0.41000	-0.31983	0.26854	-53.238	0.10724
17	0.44000	-0.24372	0.16806	-52.481	0.11122
18	0.47000	-0.16762	0.07025	-51.749	0.11467
19	0.50000	-0.09151	-0.02508	-51.051	0.11760
20	0.53000	-0.01541	-0.11814	-50.400	0.11999
21	0.56000	0.06070	-0.20915	-49.806	0.12186
22	0.59000	0.13680	-0.29837	-49.274	0.12318
23	0.62000	0.21291	-0.38602	-48.803	0.12397
24	0.65000	0.28902	-0.47231	-48.377	0.12419
25	0.68000	0.36512	-0.55735	-47.975	0.12380
26	0.71000	0.44123	-0.64121	-47.573	0.12256
27	0.74000	0.51733	-0.72388	-47.154	0.12022
28	0.77000	0.59344	-0.80532	-46.723	0.11654
29	0.80000	0.66954	-0.88554	-46.294	0.11129
30	0.83000	0.74565	-0.95458	-45.872	0.10424
31	0.86000	0.82175	-1.04247	-45.461	0.09516
32	0.89000	0.89786	-1.11927	-45.061	0.08396
33	0.92000	0.97397	-1.19502	-44.672	0.07047
34	0.95000	1.05007	-1.26976	-44.291	0.05413
35	0.97500	1.11349	-1.33129	-43.975	0.03811
36	1.00000	1.17691	-1.39215	-43.660	0.02087

------- SURFACE COORDINATES -------

PT	XS	YS	XP	YP
1	-1.35994	1.69094	-1.35994	1.69094
2	-1.36379	1.68351	-1.35174	1.69315
3	-1.36166	1.67644	-1.34540	1.68962
4	-1.30673	1.60402	-1.28631	1.62034
5	-1.24566	1.52228	-1.22053	1.54203
6	-1.18463	1.43927	-1.15472	1.46241
7	-1.12362	1.35497	-1.08888	1.38140
8	-1.06265	1.26930	-1.02302	1.29896
9	-1.00169	1.18225	-0.95713	1.21503
10	-0.94074	1.09380	-0.89123	1.12962
11	-0.87979	1.00396	-0.82535	1.04273
12	-0.80659	0.89447	-0.74634	0.93668
13	-0.73328	0.78347	-0.66743	0.82908
14	-0.65978	0.67160	-0.58872	0.72068
15	-0.58600	0.55994	-0.51029	0.61266
16	-0.51191	0.44965	-0.43217	0.50618
17	-0.43749	0.34165	-0.35438	0.40204
18	-0.36279	0.23645	-0.27687	0.30063
19	-0.28783	0.13419	-0.19962	0.20193
20	-0.21264	0.03475	-0.12259	0.10575
21	-0.13724	-0.06204	-0.04578	0.01198
22	-0.06163	-0.15638	0.03082	-0.07989
23	0.01416	-0.24847	0.10724	-0.16983
24	0.09013	-0.33855	0.18348	-0.25818
25	0.16627	-0.42685	0.25955	-0.34520
26	0.24260	-0.51355	0.33543	-0.43107
27	0.31914	-0.59879	0.41110	-0.51592
28	0.39599	-0.68256	0.48646	-0.59987
29	0.47326	-0.76475	0.56140	-0.68300
30	0.55102	-0.84526	0.63586	-0.76537
31	0.62932	-0.92399	0.70977	-0.84709
32	0.70824	-1.00086	0.78306	-0.92829
33	0.78784	-1.07584	0.85567	-1.00910
34	0.86814	-1.14892	0.92758	-1.08962
35	0.94919	-1.22008	0.99874	-1.16996
36	1.03117	-1.28913	1.06897	-1.25039
37	1.10026	-1.34500	1.12672	-1.31758
38	1.16148	-1.39327	1.17733	-1.37669
39	1.16867	-1.39572	1.18010	-1.38386
40	1.17691	-1.39215	1.17691	-1.39215

CHORD 3.99262   CAMBER 7.272   STAGGER -50.551

54

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY : STREAMLINE G

MEANLINE DATA

PT	PCT X	X	Y	B*M	T(M)
1	0	-1.43237	1.62794	-49.720	0.02052
2	0.02500	-1.36544	1.54837	-50.137	0.02799
3	0.05000	-1.29850	1.46761	-50.548	0.03550
4	0.07500	-1.23156	1.38568	-50.959	0.04304
5	0.10000	-1.16462	1.30252	-51.371	0.05058
6	0.12500	-1.09768	1.21815	-51.775	0.05809
7	0.15000	-1.03075	1.13256	-52.158	0.06554
8	0.17500	-0.96381	1.04566	-52.496	0.07290
9	0.20000	-0.89687	0.95686	-52.764	0.08014
10	0.23000	-0.81654	0.85207	-52.362	0.08859
11	0.26000	-0.73622	0.74552	-52.982	0.09670
12	0.29000	-0.65589	0.63934	-52.755	0.10439
13	0.32000	-0.57557	0.53460	-52.226	0.11158
14	0.35000	-0.49524	0.43230	-51.462	0.11819
15	0.38000	-0.41492	0.33303	-50.570	0.12416
16	0.41000	-0.33459	0.23690	-49.675	0.12948
17	0.44000	-0.25427	0.14360	-48.892	0.13416
18	0.47000	-0.17394	0.05266	-48.214	0.13818
19	0.50000	-0.09362	-0.03625	-47.601	0.14156
20	0.53000	-0.01329	-0.12334	-47.033	0.14427
21	0.56000	0.06677	-0.20677	-46.498	0.14630
22	0.59000	0.14736	-0.29265	-45.986	0.14766
23	0.62000	0.22769	-0.37507	-45.490	0.14833
24	0.65000	0.30801	-0.45610	-45.007	0.14873
25	0.68000	0.38834	-0.53578	-44.534	0.14727
26	0.71000	0.46866	-0.61417	-44.070	0.14519
27	0.74000	0.54899	-0.69131	-43.613	0.14171
28	0.77000	0.62931	-0.76724	-43.165	0.13663
29	0.80000	0.70964	-0.84200	-42.726	0.12971
30	0.83000	0.78997	-0.91563	-42.295	0.12071
31	0.86000	0.87029	-0.98817	-41.873	0.10942
32	0.89000	0.95062	-1.05965	-41.459	0.09573
33	0.92000	1.03094	-1.13011	-41.053	0.07918
34	0.95000	1.11127	-1.19957	-40.652	0.06006
35	0.97500	1.17824	-1.25671	-40.319	0.04123
36	1.00000	1.24514	-1.31318	-39.984	0.02104

SURFACE COORDINATES

PT	XS	YS	XP	YP
1	-1.43237	1.62794	-1.43237	1.62794
2	-1.43612	1.62034	-1.42414	1.63037
3	-1.43386	1.61325	-1.41763	1.62698
4	-1.37618	1.53939	-1.35469	1.55734
5	-1.31220	1.45634	-1.28479	1.47889
6	-1.24827	1.37212	-1.21485	1.39923
7	-1.18438	1.28674	-1.14487	1.31831
8	-1.12050	1.20018	-1.07487	1.23612
9	-1.05662	1.11246	-1.00487	1.15267
10	-0.99272	1.02367	-0.93489	1.06805
11	-0.92877	0.93394	-0.86497	0.98243
12	-0.85190	0.82539	-0.78119	0.87875
13	-0.77482	0.71641	-0.69761	0.77463
14	-0.69745	0.60774	-0.61431	0.67003
15	-0.61967	0.50042	-0.53147	0.56877
16	-0.54147	0.39548	-0.44902	0.46912
17	-0.46287	0.29360	-0.36697	0.37246
18	-0.38395	0.19500	-0.28523	0.27879
19	-0.30481	0.09949	-0.20372	0.18770
20	-0.22546	0.00662	-0.12242	0.09870
21	-0.14588	-0.08398	-0.04135	0.01148
22	-0.06607	-0.17251	0.03949	-0.07418
23	0.01397	-0.25913	0.12010	-0.15842
24	0.09426	-0.34395	0.20046	-0.24135
25	0.17480	-0.42706	0.28057	-0.32308
26	0.25560	-0.50850	0.36043	-0.40370
27	0.33669	-0.58627	0.43998	-0.48329
28	0.41817	-0.66633	0.51916	-0.56201
29	0.50011	-0.74261	0.59787	-0.64001
30	0.58258	-0.81707	0.67605	-0.71742
31	0.66564	-0.88965	0.75364	-0.79436
32	0.74955	-0.96028	0.83058	-0.87099
33	0.83377	-1.02891	0.90681	-0.94743
34	0.91893	-1.09552	0.98231	-1.02378
35	1.00484	-1.16008	1.05704	-1.10014
36	1.09170	-1.22235	1.13083	-1.17679
37	1.16487	-1.27243	1.19154	-1.24100
38	1.22958	-1.31546	1.24469	-1.29748
39	1.23703	-1.31737	1.24787	-1.30459
40	1.24514	-1.31318	1.24514	-1.31318

CHORD 3.97735   CAMBER 9.735   STAGGER 47.686

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINF 7

NB 20

MEANLINE DATA

PT	PCT X	X	Y	B·M	T(M)
1	0.	-1.50436	1.54495	-48.693	0.02021
2	0.02500	-1.43402	1.46435	-49.084	0.03007
3	0.05000	-1.36367	1.38265	-49.456	0.03999
4	0.07500	-1.29333	1.29991	-49.796	0.04993
5	0.10000	-1.22299	1.21623	-50.090	0.05983
6	0.12500	-1.15265	1.13176	-50.329	0.06966
7	0.15000	-1.08230	1.04667	-50.502	0.07936
8	0.17500	-1.01196	0.96116	-50.599	0.08889
9	0.20000	-0.94162	0.87549	-50.612	0.09818
10	0.23000	-0.85721	0.77284	-50.498	0.10893
11	0.26000	-0.77280	0.67090	-50.222	0.11917
12	0.29000	-0.68839	0.57029	-49.742	0.12880
13	0.32000	-0.60397	0.47180	-49.029	0.13774
14	0.35000	-0.51956	0.37605	-48.146	0.14591
15	0.38000	-0.43515	0.28338	-47.189	0.15327
16	0.41000	-0.35074	0.19373	-46.270	0.15981
17	0.44000	-0.26633	0.10673	-45.433	0.16553
18	0.47000	-0.18192	0.02192	-44.802	0.17042
19	0.50000	-0.09751	-0.06098	-44.163	0.17447
20	0.53000	-0.01310	-0.14207	-43.540	0.17765
21	0.56000	0.07131	-0.22142	-42.920	0.17995
22	0.59000	0.15573	-0.29908	-42.312	0.18137
23	0.62000	0.24014	-0.37514	-41.732	0.18189
24	0.65000	0.32455	-0.44970	-41.182	0.18139
25	0.68000	0.40896	-0.52287	-40.661	0.17969
26	0.71000	0.49337	-0.59474	-40.167	0.17653
27	0.74000	0.57778	-0.66539	-39.696	0.17163
28	0.77000	0.66219	-0.73489	-39.239	0.16475
29	0.80000	0.74660	-0.80328	-38.786	0.15563
30	0.83000	0.83101	-0.87057	-38.332	0.14403
31	0.86000	0.91543	-0.93676	-37.873	0.12970
32	0.89000	0.99984	-1.00186	-37.411	0.11255
33	0.92000	1.08425	-1.06589	-36.949	0.09238
34	0.95000	1.16866	-1.12885	-36.486	0.06854
35	0.97500	1.23900	-1.18051	-36.098	0.04562
36	1.00000	1.30934	-1.23143	-35.706	0.02115

SURFACE COORDINATES

PT	XS	YS	XP	YP
1	-1.50436	1.54495	-1.50436	1.54495
2	-1.50795	1.53738	-1.49627	1.54753
3	-1.50564	1.53040	-1.48975	1.54434
4	-1.44538	1.45450	-1.42265	1.47419
5	-1.37887	1.36965	-1.34848	1.39564
6	-1.31240	1.28379	-1.27426	1.31602
7	-1.24594	1.19704	-1.20004	1.23543
8	-1.17945	1.10953	-1.12584	1.15400
9	-1.11292	1.02143	-1.05169	1.07191
10	-1.04630	0.93295	-0.97762	0.98937
11	-0.97956	0.84434	-0.90368	0.90664
12	-0.89923	0.73820	-0.81518	0.80749
13	-0.81859	0.63277	-0.72700	0.70902
14	-0.73753	0.52868	-0.63924	0.61191
15	-0.65597	0.42664	-0.55198	0.51695
16	-0.57390	0.32737	-0.46522	0.42473
17	-0.49137	0.23130	-0.37893	0.33546
18	-0.40848	0.13850	-0.29300	0.24897
19	-0.32535	0.04870	-0.20731	0.16476
20	-0.24196	-0.03855	-0.12187	0.08238
21	-0.15828	-0.12356	-0.03673	0.00160
22	-0.07429	-0.20646	0.04809	-0.07768
23	0.01004	-0.28731	0.13259	-0.15553
24	0.09468	-0.36614	0.21677	-0.23202
25	0.17960	-0.44301	0.30067	-0.30727
26	0.26483	-0.51796	0.38427	-0.38144
27	0.35042	-0.59103	0.46750	-0.45471
28	0.43644	-0.66219	0.55030	-0.52729
29	0.52297	-0.73142	0.63259	-0.59936
30	0.61009	-0.79869	0.71430	-0.67110
31	0.69786	-0.86394	0.79535	-0.74262
32	0.78635	-0.92706	0.87568	-0.81408
33	0.87561	-0.98795	0.95524	-0.88557
34	0.96565	-1.04656	1.03402	-0.95717
35	1.05648	-1.10281	1.11201	-1.02898
36	1.14828	-1.15640	1.18904	-1.10130
37	1.22556	-1.19894	1.25244	-1.16208
38	1.29379	-1.23512	1.30790	-1.21552
39	1.30145	-1.23634	1.31151	-1.22753
40	1.30934	-1.23143	1.30934	-1.23143

CHORD 3.95288   CAMBER 12.987   STAGGER -44.618

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 8

------ MEANLINE DATA ------

PT	PCT X	X	Y	B+M	T(M)
1	0.	-1.57450	1.44175	-47.649	0.01929
2	0.02500	-1.50089	1.36065	-47.891	0.03200
3	0.05000	-1.42727	1.27888	-48.112	0.04476
4	0.07500	-1.35365	1.19652	-48.294	0.05749
5	0.10000	-1.28004	1.11372	-48.417	0.07010
6	0.12500	-1.20642	1.03066	-48.467	0.08256
7	0.15000	-1.13280	0.94758	-48.426	0.09481
8	0.17500	-1.05919	0.86478	-48.272	0.10677
9	0.20000	-0.98557	0.78262	-47.984	0.11833
10	0.23000	-0.89723	0.68541	-47.455	0.13159
11	0.26000	-0.80889	0.59032	-46.726	0.14407
12	0.29000	-0.72055	0.49792	-45.814	0.15568
13	0.32000	-0.63221	0.40867	-44.751	0.16633
14	0.35000	-0.54387	0.32281	-43.606	0.17599
15	0.38000	-0.45553	0.24033	-42.468	0.18464
16	0.41000	-0.36719	0.16096	-41.431	0.19227
17	0.44000	-0.27885	0.08420	-40.571	0.19888
18	0.47000	-0.19051	0.00954	-39.854	0.20446
19	0.50000	-0.10217	-0.06336	-39.217	0.20899
20	0.53000	-0.01382	-0.13469	-38.624	0.21244
21	0.56000	0.07452	-0.20455	-38.050	0.21478
22	0.59000	0.16286	-0.27300	-37.490	0.21600
23	0.62000	0.25120	-0.34009	-36.942	0.21605
24	0.65000	0.33954	-0.40587	-36.404	0.21477
25	0.68000	0.42788	-0.47038	-35.873	0.21191
26	0.71000	0.51622	-0.53365	-35.347	0.20724
27	0.74000	0.60456	-0.59570	-34.824	0.20048
28	0.77000	0.69290	-0.65656	-34.302	0.19140
29	0.80000	0.78124	-0.71624	-33.777	0.17978
30	0.83000	0.86958	-0.77474	-33.247	0.16536
31	0.86000	0.95792	-0.83206	-32.711	0.14791
32	0.89000	1.04626	-0.88821	-32.169	0.12736
33	0.92000	1.13460	-0.94319	-31.622	0.10353
34	0.95000	1.22294	-0.99700	-31.068	0.07572
35	0.97500	1.29656	-1.04095	-30.600	0.04928
36	1.00000	1.37017	-1.08407	-30.128	0.02116

------ SURFACE COORDINATES ------

PT	XS	YS	XP	YP
1	-1.57450	1.44175	-1.57450	1.44175
2	-1.57784	1.43441	-1.56681	1.44439
3	-1.57556	1.42777	-1.56049	1.44151
4	-1.51276	1.34992	-1.48902	1.37138
5	-1.44393	1.26393	-1.41061	1.29382
6	-1.37511	1.17740	-1.33220	1.21564
7	-1.30626	1.09045	-1.25382	1.13698
8	-1.23732	1.00328	-1.17552	1.05803
9	-1.16827	0.91612	-1.09734	0.97904
10	-1.09903	0.82925	-1.01934	0.90031
11	-1.02953	0.74302	-0.94161	0.82222
12	-0.94570	0.64092	-0.84876	0.72990
13	-0.86133	0.54094	-0.75644	0.63970
14	-0.77636	0.44367	-0.66473	0.55218
15	-0.69076	0.34961	-0.57366	0.46773
16	-0.60456	0.25909	-0.48318	0.38653
17	-0.51786	0.17223	-0.39319	0.30843
18	-0.43080	0.08888	-0.30357	0.23304
19	-0.34352	0.00867	-0.21417	0.15974
20	-0.25602	-0.06894	-0.12499	0.08802
21	-0.16823	-0.14432	-0.03610	0.01759
22	-0.08013	-0.21768	0.05248	-0.05171
23	0.00833	-0.28912	0.14071	-0.11998
24	0.09713	-0.35869	0.22859	-0.18730
25	0.18627	-0.42643	0.31612	-0.25375
26	0.27581	-0.49230	0.40327	-0.31944
27	0.36579	-0.55624	0.48997	-0.38452
28	0.45627	-0.61817	0.57616	-0.44913
29	0.54732	-0.67799	0.66180	-0.51342
30	0.63897	-0.73562	0.74683	-0.57751
31	0.73126	-0.79096	0.83121	-0.64152
32	0.82425	-0.84388	0.91491	-0.70559
33	0.91795	-0.89429	0.99789	-0.76983
34	1.01235	-0.94212	1.08016	-0.83431
35	1.10746	-0.98727	1.16174	-0.89911
36	1.20340	-1.02943	1.24248	-0.96457
37	1.28402	-1.06215	1.30910	-1.01974
38	1.35495	-1.08949	1.36735	-1.06817
39	1.36273	-1.08983	1.37153	-1.07493
40	1.37017	-1.08407	1.37017	-1.08407

CHORD 3.87955   CAMBER 17.521   STAGGER -40 622

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 9

NB 20

MEANLINE DATA

PT	PCT X	X	Y	B*M	T(M)
1	0.	-1.62953	1.30478	-46.156	0.01883
2	0.02500	-1.55278	1.22746	-46.129	0.03449
3	0.05000	-1.47602	1.14511	-46.087	0.05011
4	0.07500	-1.39927	1.06548	-46.017	0.06561
5	0.10000	-1.32251	0.98609	-45.905	0.08091
6	0.12500	-1.24576	0.90710	-45.728	0.09595
7	0.15000	-1.16900	0.82872	-45.454	0.11062
8	0.17500	-1.09225	0.75128	-45.023	0.12484
9	0.20000	-1.01549	0.67527	-44.376	0.13849
10	0.23000	-0.92338	0.58673	-43.313	0.15403
11	0.26000	-0.83128	0.50183	-41.983	0.16851
12	0.29000	-0.73917	0.42099	-40.566	0.18187
13	0.32000	-0.64707	0.34396	-39.269	0.19405
14	0.35000	-0.55496	0.27019	-38.133	0.20506
15	0.38000	-0.46285	0.19919	-37.140	0.21491
16	0.41000	-0.37075	0.13057	-36.241	0.22357
17	0.44000	-0.27864	0.06412	-35.385	0.23102
18	0.47000	-0.18654	-0.00031	-34.566	0.23721
19	0.50000	-0.09443	-0.06285	-33.790	0.24210
20	0.53000	-0.00232	-0.12362	-33.050	0.24566
21	0.56000	0.08978	-0.18274	-32.337	0.24786
22	0.59000	0.18189	-0.24025	-31.631	0.24865
23	0.62000	0.27399	-0.29620	-30.917	0.24797
24	0.65000	0.36610	-0.35059	-30.203	0.24561
25	0.68000	0.45821	-0.40345	-29.504	0.24135
26	0.71000	0.55031	-0.45486	-28.838	0.23496
27	0.74000	0.64242	-0.50492	-28.216	0.22621
28	0.77000	0.73452	-0.55372	-27.621	0.21490
29	0.80000	0.82663	-0.60131	-27.032	0.20083
30	0.83000	0.91874	-0.64771	-26.439	0.18375
31	0.86000	1.01084	-0.69291	-25.839	0.16344
32	0.89000	1.10295	-0.73693	-25.244	0.13984
33	0.92000	1.19505	-0.77979	-24.666	0.11281
34	0.95000	1.28716	-0.82153	-24.101	0.08163
35	0.97500	1.36392	-0.85550	-23.634	0.05223
36	1.00000	1.44067	-0.88871	-23.169	0.02111

SURFACE COORDINATES

PT	XS	YS	XP	YP
1	-1.62953	1.30478	-1.62953	1.30478
2	-1.63264	1.29746	-1.622 0	1.30759
3	-1.63029	1.29103	-1.61576	1.30499
4	-1.56521	1.21295	-1.54034	1.23686
5	-1.49407	1.12774	-1.45797	1.16249
6	-1.42287	1.04270	-1.37566	1.08826
7	-1.35157	0.95794	-1.29346	1.01425
8	-1.28011	0.87361	-1.21140	0.94059
9	-1.20842	0.78992	-1.12958	0.86752
10	-1.13640	0.70716	-1.04809	0.79540
11	-1.06392	0.62578	-0.96706	0.72477
12	-0.97622	0.53069	-0.87055	0.64276
13	-0.88764	0.43920	-0.77492	0.56446
14	-0.79831	0.35191	-0.68004	0.49007
15	-0.70848	0.26884	-0.58565	0.41907
16	-0.61827	0.18954	-0.49165	0.35084
17	-0.52773	0.11353	-0.39798	0.28485
18	-0.43684	0.04041	-0.30466	0.22073
19	-0.34553	-0.03005	-0.21175	0.15829
20	-0.25383	-0.09798	-0.11925	0.09736
21	-0.16175	-0.16345	-0.02711	0.03776
22	-0.06931	-0.22658	0.06466	-0.02067
23	0.02349	-0.28745	0.15607	-0.07802
24	0.11669	-0.34611	0.24709	-0.13440
25	0.21029	-0.40257	0.33770	-0.18983
26	0.30432	-0.45672	0.42788	-0.24445
27	0.39877	-0.50847	0.51764	-0.29842
28	0.49365	-0.55777	0.60698	-0.35195
29	0.58894	-0.60458	0.69589	-0.40525
30	0.68471	-0.64892	0.78434	-0.45852
31	0.78099	-0.69076	0.87227	-0.51187
32	0.87783	-0.72998	0.95964	-0.56545
33	0.97523	-0.76646	1.04646	-0.61936
34	1.07313	-0.80017	1.13277	-0.67368
35	1.17152	-0.83105	1.21859	-0.72853
36	1.27049	-0.85879	1.30383	-0.78428
37	1.35345	-0.87942	1.37439	-0.83157
38	1.42620	-0.89612	1.43607	-0.87313
39	1.43398	-0.89540	1.44096	-0.87941
40	1.44067	-0.88871	1.44067	-0.88871

CHORD 3.77327   CAMBER 22.987   STAGGER -35.544

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 10

------ MEANLINE DATA ------

PT	PCT X	X	Y	B*M	T(M)
1	0.	-1.63112	1.12339	-44.427	0.02118
2	0.02500	-1.55176	1.04583	-44.254	0.03957
3	0.05000	-1.47240	0.96880	-44.032	0.05786
4	0.07500	-1.39305	0.89249	-43.701	0.07594
5	0.10000	-1.31369	0.81726	-43.207	0.09369
6	0.12500	-1.23434	0.74356	-42.530	0.11099
7	0.15000	-1.15498	0.67182	-41.664	0.12771
8	0.17500	-1.07563	0.60243	-40.652	0.14377
9	0.20000	-0.99627	0.53559	-39.548	0.15907
10	0.23000	-0.90104	0.45887	-38.154	0.17638
11	0.26000	-0.80582	0.38593	-36.748	0.19249
12	0.29000	-0.71059	0.31656	-35.405	0.20736
13	0.32000	-0.61536	0.25041	-34.189	0.22091
14	0.35000	-0.52014	0.18706	-33.088	0.23315
15	0.38000	-0.42491	0.12623	-32.063	0.24402
16	0.41000	-0.32968	0.06772	-31.064	0.25349
17	0.44000	-0.23445	0.01150	-30.048	0.26150
18	0.47000	-0.13923	-0.04246	-29.033	0.26799
19	0.50000	-0.04400	-0.09425	-28.049	0.27292
20	0.53000	0.05123	-0.14398	-27.104	0.27625
21	0.56000	0.14645	-0.19177	-26.199	0.27794
22	0.59000	0.24168	-0.23771	-25.314	0.27791
23	0.62000	0.33691	-0.28186	-24.431	0.27606
24	0.65000	0.43213	-0.32424	-23.549	0.27270
25	0.68000	0.52736	-0.36488	-22.673	0.26615
26	0.71000	0.62259	-0.40382	-21.810	0.25773
27	0.74000	0.71781	-0.44111	-20.962	0.24677
28	0.77000	0.81304	-0.47679	-20.118	0.23311
29	0.80000	0.90827	-0.51087	-19.268	0.21657
30	0.83000	1.00349	-0.54337	-18.411	0.19697
31	0.86000	1.09872	-0.57427	-17.549	0.17417
32	0.89000	1.19395	-0.60361	-16.696	0.14811
33	0.92000	1.28918	-0.63141	-15.863	0.11865
34	0.95000	1.38440	-0.65774	-15.044	0.08514
35	0.97500	1.46376	-0.67856	-14.365	0.05394
36	1.00000	1.54311	-0.69838	-13.685	0.02109

------ SURFACE COORDINATES ------

PT	XS	YS	XP	YP
1	-1.63112	1.12339	-1.63112	1.12339
2	-1.63440	1.11498	-1.62284	1.12684
3	-1.63160	1.10781	-1.61556	1.12419
4	-1.56557	1.03166	-1.53795	1.06000
5	-1.49251	0.94800	-1.45230	0.98960
6	-1.41928	0.86504	-1.36682	0.91994
7	-1.34576	0.78312	-1.28162	0.85141
8	-1.27185	0.70266	-1.19683	0.78445
9	-1.19743	0.62412	-1.11253	0.71953
10	-1.12246	0.54789	-1.02879	0.65697
11	-1.04691	0.47426	-0.94563	0.59692
12	-0.95553	0.38952	-0.84656	0.52822
13	-0.86340	0.30880	-0.74823	0.46305
14	-0.77066	0.23206	-0.65052	0.40107
15	-0.67743	0.15904	-0.55329	0.34178
16	-0.58378	0.08939	-0.45650	0.28473
17	-0.48968	0.02283	-0.36014	0.22963
18	-0.39508	-0.04085	-0.26428	0.17629
19	-0.29992	-0.10168	-0.16899	0.12468
20	-0.20426	-0.15962	-0.07420	0.07469
21	-0.10817	-0.21468	0.02017	0.02618
22	-0.01171	-0.26693	0.11416	-0.02102
23	0.08510	-0.31646	0.20781	-0.06707
24	0.18227	-0.36332	0.30109	-0.11210
25	0.27982	-0.40753	0.39399	-0.15619
26	0.37776	-0.44900	0.48651	-0.19947
27	0.47606	-0.48767	0.57866	-0.24208
28	0.57471	-0.52346	0.67046	-0.28417
29	0.67367	-0.55633	0.76195	-0.32588
30	0.77295	-0.58623	0.85313	-0.36734
31	0.87253	-0.61309	0.94400	-0.40865
32	0.97239	-0.63681	1.03460	-0.44992
33	1.07246	-0.65730	1.12498	-0.49124
34	1.17267	-0.67454	1.21522	-0.53267
35	1.27296	-0.68848	1.30539	-0.57435
36	1.37335	-0.69885	1.39545	-0.61662
37	1.45707	-0.70469	1.47045	-0.65243
38	1.53006	-0.70822	1.53609	-0.68365
39	1.53757	-0.70616	1.54191	-0.68915
40	1.54311	0.69838	1.54311	0.69838

CHORD 3.65986   CAMBER 30.742   STAGGER -29.853

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 11

NB 20

| ------- MEANLINE DATA ------- | | | | | | ----- SURFACE COORDINATES ----- | | | |
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.0	-1.62321	0.91141	-40.844	0.02618	1	-1.62321	0.91141	-1.62321	0.91141
2	0.02500	-1.54176	0.84152	-40.421	0.04510	2	-1.62662	0.90071	-1.51331	0.91633
3	0.05000	-1.46031	0.77270	-39.952	0.06388	3	-1.62264	0.89211	-1.60405	0.91367
4	0.07500	-1.37886	0.70513	-39.391	0.08241	4	-1.55638	0.82435	-1.52714	0.85868
5	0.10000	-1.29741	0.63904	-38.696	0.10062	5	-1.48082	0.74822	-1.43980	0.79719
6	0.12500	-1.21596	0.57474	-37.849	0.11841	6	-1.40501	0.67328	-1.3527.1	0.73697
7	0.15000	-1.13451	0.51256	-36.847	0.13566	7	-1.32886	0.59977	-1.26596	0.67830
8	0.17500	-1.05306	0.45274	-35.724	0.15228	8	-1.25229	0.52799	-1.17963	0.62149
9	0.20000	-0.97161	0.39543	-34.522	0.16822	9	-1.17518	0.45828	-1.09383	0.56683
10	0.23000	-0.87387	0.33006	-33.011	0.18636	10	-1.09752	0.39092	-1.00860	0.51455
11	0.26000	-0.77613	0.26841	-31.466	0.20336	11	-1.01928	0.32613	-0.92394	0.46473
12	0.29000	-0.67839	0.21039	-29.9.7	0.21918	12	-0.92463	0.25193	-0.82310	0.40820
13	0.32000	-0.58065	0.15587	-28.392	0.23375	13	-0.82921	0.18138	-0.72305	0.35514
14	0.35000	-0.48291	0.10467	-26.905	0.24704	14	-0.73305	0.11541	-0.62373	0.30538
15	0.38000	-0.38517	0.05661	-25.465	0.25902	15	-0.63622	0.05305	-0.52507	0.25869
16	0.41000	-0.28743	0.01152	-24.079	0.26963	16	-0.53880	-0.00548	-0.42701	0.21482
17	0.44000	-0.18969	-0.03080	-22.751	0.27882	17	-0.44085	-0.06031	-0.32948	0.17354
18	0.47000	-0.09195	-0.07052	-21.486	0.28656	18	-0.34243	-0.11157	-0.23242	0.13460
19	0.50000	0.00579	-0.10780	-20.283	0.29281	19	-0.24360	-0.15037	-0.13577	0.09776
20	0.53000	0.10353	-0.14281	-19.129	0.29750	20	-0.14443	-0.20384	-0.03947	0.06280
21	0.56000	0.20127	-0.17564	-18.003	0.30060	21	-0.04496	-0.24513	0.05654	0.02952
22	0.59000	0.29901	-0.20633	-16.861	0.30206	22	0.05479	-0.28334	0.15228	-0.00227
23	0.62000	0.39675	-0.23486	-15.670	0.30181	23	0.15482	-0.31857	0.24772	-0.03270
24	0.65000	0.49449	-0.26116	-14.446	0.29959	24	0.25521	-0.35087	0.34282	-0.06180
25	0.68000	0.59223	-0.28522	-13.216	0.29512	25	0.35599	-0.33016	0.43751	-0.08956
26	0.71000	0.68997	-0.30708	-12.007	0.28806	26	0.45712	-0.40622	0.53186	-0.11610
27	0.74000	0.78771	-0.32682	-10.838	0.27806	27	0.55850	-0.42887	0.62597	-0.14157
28	0.77000	0.88545	-0.34453	-9.695	0.26483	28	0.66001	-0.44796	0.71993	-0.16621
29	0.80000	0.98319	-0.36023	-8.560	0.24805	29	0.76157	-0.46337	0.81385	-0.19027
30	0.83000	1.08093	-0.37395	-7.419	0.22734	30	0.86315	-0.47505	0.90775	-0.21400
31	0.86000	1.17867	-0.38568	-6.256	0.20240	31	0.96473	-0.48287	1.00165	-0.23759
32	0.89000	1.27641	-0.39536	-5.053	0.17313	32	1.06625	-0.48667	1.09561	-0.26123
33	0.92000	1.37415	-0.40293	-3.793	0.13925	33	1.16764	-0.48627	1.18970	-0.28508
34	0.95000	1.47189	-0.40829	-2.471	0.09962	34	1.26879	-0.48159	1.28404	-0.30913
35	0.97500	1.55334	-0.41099	-1.323	0.06181	35	1.36955	-0.47240	1.37876	-0.33346
36	1.00000	1.63479	-0.41204	-0.152	0.02160	36	1.46974	-0.45805	1.47404	-0.35853
						37	1.55263	-0.44189	1.55406	-0.38009
						38	1.62423	-0.42543	1.62439	-0.39858
						39	1.63110	-0.42139	1.63148	-0.40301
						40	1.63479	-0.41204	1.63479	-0.41204

CHORD   3.51655   CAMBER   40.691   STAGGER   -22.108

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 12

------- MEANLINE DATA -------

PT	PCT X	X	Y	B+M	T(M)
1	0.	-1.64796	0.79749	-38.178	0.03474
2	0.02500	-1.56546	0.73331	-37.578	0.05670
3	0.05000	-1.48296	0.67055	-36.928	0.07850
4	0.07500	-1.40046	0.60935	-36.198	0.10000
5	0.10000	-1.31796	0.54987	-35.360	0.12102
6	0.12500	-1.23545	0.49233	-34.401	0.14143
7	0.15000	-1.15295	0.43695	-33.321	0.16111
8	0.17500	-1.07045	0.38390	-32.154	0.17997
9	0.20000	-0.98795	0.33324	-30.942	0.19794
10	0.23000	-0.88895	0.27561	-29.462	0.21820
11	0.26000	-0.78995	0.22135	-27.984	0.23692
12	0.29000	-0.69095	0.17036	-26.514	0.25400
13	0.32000	-0.59194	0.12254	-25.051	0.26932
14	0.35000	-0.49294	0.07779	-23.598	0.28281
15	0.38000	-0.39394	0.03601	-22.159	0.29435
16	0.41000	-0.29494	-0.00288	-20.739	0.30386
17	0.44000	-0.19594	-0.03900	-19.346	0.31126
18	0.47000	-0.09694	-0.07245	-18.006	0.31645
19	0.50000	0.00207	-0.10341	-16.735	0.31937
20	0.53000	0.10107	-0.13204	-15.528	0.31992
21	0.56000	0.20007	-0.15846	-14.361	0.31805
22	0.59000	0.29907	-0.18273	-13.173	0.31380
23	0.62000	0.39807	-0.20477	-11.925	0.30725
24	0.65000	0.49707	-0.22453	-10.644	0.29847
25	0.68000	0.59608	-0.24199	-9.364	0.28750
26	0.71000	0.69508	-0.25721	-8.116	0.27438
27	0.74000	0.79408	-0.27025	-6.890	0.25914
28	0.77000	0.89308	-0.28108	-5.570	0.24182
29	0.80000	0.99208	-0.28945	-4.062	0.22250
30	0.83000	1.09108	-0.29502	-2.343	0.20119
31	0.86000	1.19009	-0.29744	-0.429	0.17793
32	0.89000	1.28909	-0.29644	1.597	0.15283
33	0.92000	1.38809	-0.29190	3.665	0.12585
34	0.95000	1.48709	-0.28373	5.784	0.09662
35	0.97500	1.56959	-0.27405	7.597	0.07043
36	1.00000	1.65209	-0.26170	9.424	0.04332

------- SURFACE COORDINATES -------

PT	XS	YS	XP	YP
1	-1.64796	0.79749	-1.64796	0.79749
2	-1.65189	0.78296	-1.63511	0.80473
3	-1.64620	0.77173	-1.62255	0.80193
4	-1.58275	0.71084	-1.54817	0.75578
5	-1.50654	0.63918	-1.45938	0.70193
6	-1.42999	0.56900	-1.37093	0.64969
7	-1.35297	0.50052	-1.28294	0.59921
8	-1.27541	0.43398	-1.19550	0.55068
9	-1.19720	0.36964	-1.10870	0.50427
10	-1.11834	0.30772	-1.02256	0.46008
11	-1.03884	0.24836	-0.93706	0.41812
12	-0.94261	0.18062	-0.83529	0.37060
13	-0.84553	0.11674	-0.73436	0.32596
14	-0.74764	0.05672	-0.63425	0.28400
15	-0.64896	0.00054	-0.53493	0.24453
16	-0.54955	-0.05179	-0.47634	0.20736
17	-0.44945	-0.10029	-0.33843	0.17232
18	-0.34874	-0.14497	-0.24114	0.13920
19	-0.24749	-0.18584	-0.14438	0.10784
20	-0.14585	-0.22293	-0.04803	0.07803
21	-0.04392	-0.25633	0.04805	0.04951
22	0.05824	-0.28616	0.14389	0.02209
23	0.16063	-0.31252	0.23951	-0.00441
24	0.26332	-0.33550	0.33483	-0.02995
25	0.36633	-0.35508	0.42982	0.05446
26	0.46951	-0.37120	0.52464	0.07786
27	0.57269	-0.38383	0.61946	0.10016
28	0.67571	-0.39302	0.71445	0.12139
29	0.77854	-0.39888	0.80962	0.14162
30	0.88134	-0.40142	0.90482	0.16074
31	0.98470	-0.40042	0.99996	0.17849
32	1.08637	-0.39553	1.09520	0.19451
33	1.18942	-0.38641	1.19075	0.20848
34	1.29122	-0.37283	1.28696	0.22006
35	1.39211	-0.35470	1.38407	0.22910
36	1.49196	-0.33179	1.48222	0.23566
37	1.57425	-0.30896	1.56494	0.23915
38	1.63487	-0.28998	1.62711	0.24028
39	1.64746	-0.28086	1.64276	0.24579
40	1.65209	-0.26170	1.65209	0.26170

CHORD   3.46587   CAMBER   47.602   STAGGER   -17.795

PHASE IV ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 13

NB 20

		----- MEANLINE DATA -----						----- SURFACE COORDINATES -----		
PT	PCT X	X	Y	B+M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.68772	0.69918	-32.388	0.05300	1	-1.68772	0.69918	-1.68772	0.69918
2	0.02500	-1.60391	0.64626	-32.144	0.07280	2	-1.69146	0.67671	-1.66922	0.71212
3	0.05000	-1.52010	0.59389	-31.847	0.09264	3	-1.68102	0.66046	-1.64988	0.70969
4	0.07500	-1.43629	0.54219	-31.478	0.11240	4	-1.62328	0.61544	-1.58455	0.67709
5	0.10000	-1.35248	0.49132	-31.020	0.13192	5	-1.54454	0.55454	-1.49566	0.63324
6	0.12500	-1.26867	0.44146	-30.460	0.15106	6	-1.46564	0.49426	-1.40694	0.59012
7	0.15000	-1.18486	0.39281	-29.781	0.16970	7	-1.38647	0.43479	-1.31849	0.54785
8	0.17500	-1.10104	0.34561	-28.962	0.18774	8	-1.30696	0.37635	-1.23038	0.50656
9	0.20000	-1.01723	0.30013	-27.990	0.20506	9	-1.22700	0.31916	-1.14271	0.46646
10	0.23000	-0.91666	0.24816	-26.630	0.22480	10	-1.14650	0.26349	-1.05559	0.42774
11	0.26000	-0.81609	0.19937	-25.095	0.24326	11	-1.06535	0.20959	-0.96911	0.39066
12	0.29000	-0.71551	0.15399	-23.473	0.26031	12	-0.96704	0.14768	-0.86628	0.34863
13	0.32000	-0.61494	0.11200	-21.841	0.27581	13	-0.86767	0.08922	-0.76450	0.30952
14	0.35000	-0.51436	0.07331	-20.255	0.28971	14	-0.76735	0.03460	-0.66367	0.27337
15	0.38000	-0.41379	0.03769	-18.762	0.30190	15	-0.66624	-0.01600	-0.56363	0.24001
16	0.41000	-0.31322	0.00488	-17.397	0.31232	16	-0.56451	-0.06259	-0.46422	0.20921
17	0.44000	-0.21264	-0.02543	-16.161	0.32087	17	-0.46234	-0.10524	-0.36524	0.18062
18	0.47000	-0.11207	-0.05348	-15.016	0.32748	18	-0.35991	-0.14414	-0.26653	0.15390
19	0.50000	-0.01150	-0.07942	-13.922	0.33205	19	-0.25730	-0.17952	-0.16799	0.12867
20	0.53000	0.08908	-0.10335	-12.837	0.33445	20	-0.15449	-0.21163	-0.06965	0.10467
21	0.56000	0.18965	-0.12524	-11.713	0.33463	21	-0.05144	-0.24057	0.02845	0.08172
22	0.59000	0.29022	-0.14501	-10.500	0.33255	22	0.05192	-0.26640	0.12623	0.05970
23	0.62000	0.39080	-0.16245	-9.160	0.32826	23	0.15568	-0.28907	0.22362	0.03859
24	0.65000	0.49137	-0.17736	-7.672	0.32181	24	0.25992	-0.30850	0.32053	0.01849
25	0.68000	0.59195	-0.18946	-6.020	0.31328	25	0.36467	-0.32443	0.41693	-0.00042
26	0.71000	0.69252	-0.19848	-4.194	0.30273	26	0.46989	-0.33682	0.51285	-0.01789
27	0.74000	0.79309	-0.20411	-2.187	0.29021	27	0.57552	-0.34524	0.60837	-0.03368
28	0.77000	0.89367	-0.20605	0.001	0.27575	28	0.68145	-0.34944	0.70359	-0.04751
29	0.80000	0.99424	-0.20400	2.365	0.25937	29	0.78756	-0.34911	0.79863	-0.05911
30	0.83000	1.09481	-0.19765	4.887	0.24105	30	0.89367	-0.34393	0.89366	-0.06818
31	0.86000	1.19539	-0.18671	7.539	0.22081	31	0.99959	-0.33358	0.98889	-0.07443
32	0.89000	1.29596	-0.17096	10.275	0.19874	32	1.10508	-0.31774	1.08455	-0.07756
33	0.92000	1.39653	-0.15019	13.065	0.17476	33	1.20987	-0.29617	1.18090	-0.07726
34	0.95000	1.49711	-0.12420	15.913	0.14834	34	1.31369	-0.26873	1.27823	-0.07318
35	0.97500	1.58092	-0.09839	18.322	0.12434	35	1.41629	-0.23531	1.37678	-0.06507
36	1.00000	1.66473	-0.06867	20.712	0.09934	36	1.51744	-0.19553	1.47677	-0.05287
						37	1.60046	-0.15740	1.56138	-0.03937
						38	1.63713	-0.13902	1.59994	-0.03212
						39	1.66212	-0.11378	1.63735	-0.03747
						40	1.66473	-0.06867	1.66473	-0.06867

CHORD 3.43927   CAMBER 53.100   STAGGER -12.901

3.   PLANE SECTION BLADE COORDINATES

Figure 67 shows the stacked Phase IV rotor plane sections. The following tabulation gives the coordinates for these sections. These sections are spaced one half inch apart, beginning at the tip height of 8.5 inches and progressing inward to 2.5 inches. These are the same section locations as given for the baseline rotor in Reference 1. Also included in the tabulation are coordinates for the section meanline, the meanline angle, and the section percent thickness at each point. Plane section chord, camber angle, and stagger angle are also given. These coordinates are intended to represent the blade under hot running conditions and do not include any corrections for blade untwist, meanline deformation, centrifugal growth or thermal growth.

ROTATION
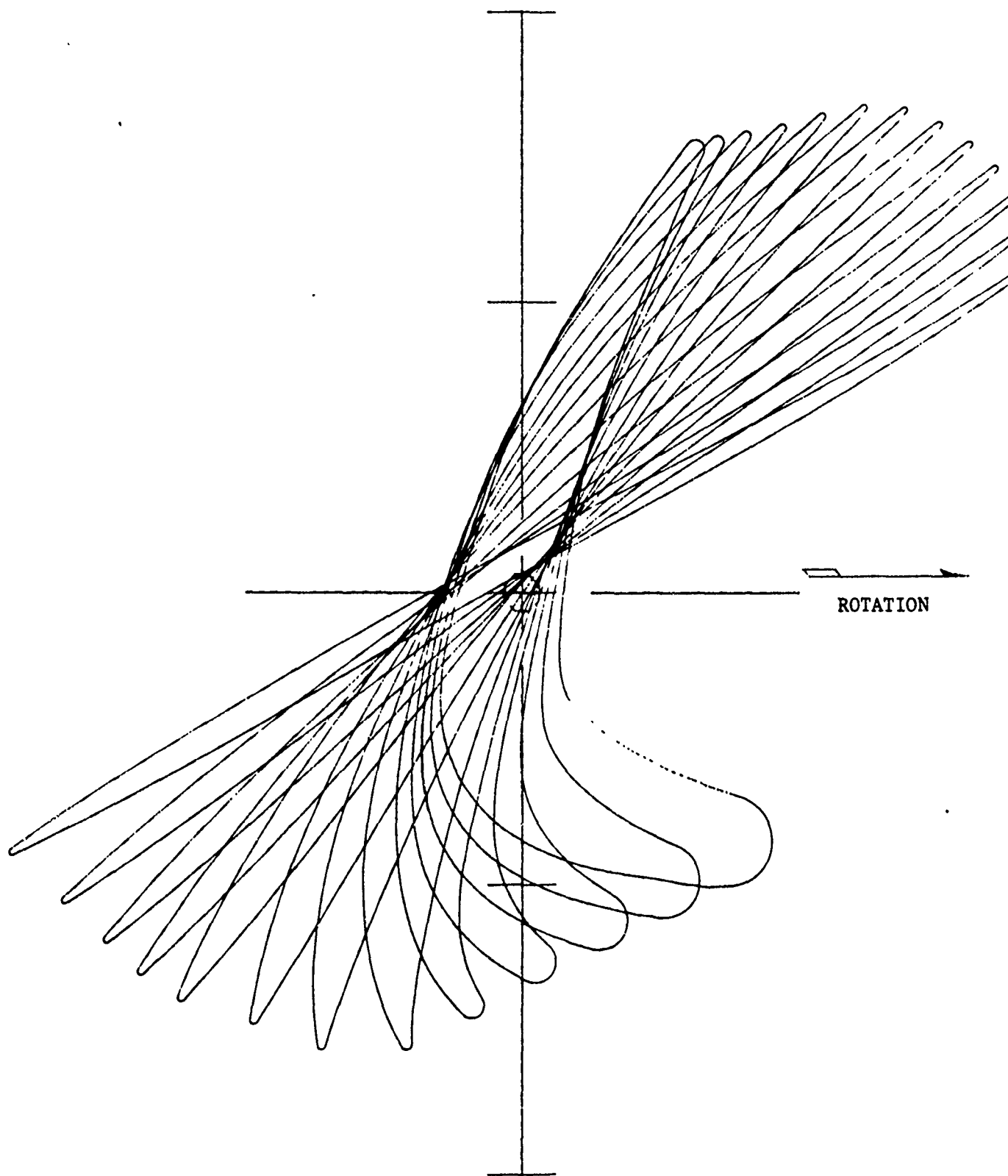
Figure 67 . **Stacked Phase IV Rotor Plane Sections**

PHASE V ROTOR

STAGE 5 ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0   ETA 0.

SECTION NO 3   SECTION CC   RHO 7.5000

CHORD   STAGGER   CAMBER
7.9448   51.792   7.530

AREA 0.339480   SURFACE ARC LENGTH 7.92963

	ALPHA	UPSILON
SECTION C G	-0.00811	-0.04336
STREAMSURFACE SECTION C G.	-0.01733	-0.03538
BLADE AXIS	-0.01733	-0.03538
STACKING AXIS (RADIAL)	-0.00210	0.

65

PHASF V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0 MU 0. NR 20 ETA 0.

SECTION NO 3 SECTION CC RHO 7.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.02283	-0.55613	0.54881	-0.48278	0.60110
16	0.02415	-0.48474	0.44535	-0.40778	0.50149
17	0.02535	-0.41311	0.34435	-0.33301	0.40423
18	0.02644	-0.34123	0.24590	-0.25849	0.30940
19	0.02741	-0.26915	0.15004	-0.18419	0.21690
20	0.02825	-0.19687	0.05658	-0.11007	0.12647
21	0.02897	-0.12444	-0.03473	-0.03610	0.03777
22	0.02957	-0.05186	-0.12430	0.03774	-0.04965
23	0.03004	0.02082	-0.21250	0.11143	-0.13615
24	0.03038	0.09368	-0.29960	0.18497	-0.22197
25	0.03059	0.16671	-0.38579	0.25833	-0.30729
26	0.03067	0.23992	-0.47119	0.33152	-0.39216
27	0.03061	0.31332	-0.55584	0.40451	-0.47670
28	0.03036	0.38698	-0.63977	0.47725	-0.56108
29	0.02985	0.46100	-0.72300	0.54962	-0.64547
30	0.02902	0.53548	-0.80552	0.62153	-0.73002
31	0.02780	0.61054	-0.88731	0.69287	-0.81484
32	0.02614	0.68629	0.96819	0.76352	-0.89989
33	0.02395	0.76281	-1.04797	0.83339	-0.98515
34	0.02121	0.84017	-1.12640	0.90243	-1.07048
35	0.01788	0.91840	-1.20320	0.97059	-1.15574
36	0.01381	0.99768	-1.27786	1.03771	-1.24088
37	0.00980	1.06459	-1.33812	1.09279	-1.31167
38	0.00547	1.12371	-1.38981	1.14087	-1.37350
39	0.00547	1.13098	-1.39270	1.14338	-1.38105
40	0.00547	1.13969	-1.38943	1.13969	-1.38943

LF RAD 0.01052 CENTER AT ALPHA -1.29405 UPSILON 1.70174
TE RAD 0.01190 CENTER AT ALPHA 1.13148 UPSILON -1.38081

66

STAGE 5. ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R O.   MU O.   NB 20   ETA O.

SECTION NO 3   SECTION CC   RHO 7.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA·
18	0.4700	0.02825	-0.15347	0.09153	51.161
19	0.5000	0.02897	-0.08027	0.00152	50.621
20	0.5300	0.02957	-0.00707	-0.08697	50.206
21	0.5600	0.03004	0.06612	-0.17432	49.882
22	0.5900	0.03038	0.13932	-0.26078	49.626
23	0.6200	0.03059	0.21252	-0.34654	49.411
24	0.6500	0.03067	0.28572	-0.43167	49.217
25	0.6800	0.03061	0.35891	-0.51627	49.051
26	0.7100	0.03036	0.43211	-0.60042	48.921
27	0.7400	0.02985	0.50531	-0.68423	48.818
28	0.7700	0.02902	0.57851	-0.76777	48.735
29	0.8000	0.02780	0.65170	-0.85107	48.644
30	0.8300	0.02614	0.72490	-0.93404	48.512
31	0.8600	0.02395	0.79810	-1.01656	48.326
32	0.8900	0.02121	0.87130	-1.09844	48.070
33	0.9200	0.01788	0.94450	-1.17947	47.726
34	0.9500	0.01381	1.01769	-1.25937	47.267
35	0.9750	0.00980	1.07869	-1.32490	46.832
36	1.0000	0.00547	1.13969	-1.38943	46.392

CHORD	STAGGER	CAMBER
3.9448	51.792	7.530

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00519	-1.30023	1.71024	-1.30023	1.71024
2	0.00519	-1.30448	1.70301	-1.29186	1.71203
3	0.00519	-1.30271	1.69578	-1.28570	1.70814
4	0.00659	-1.24982	1.61795	-1.22864	1.63301
5	0.00801	-1.19120	1.52976	-1.16527	1.54782
6	0.00946	-1.13263	1.43986	-1.10184	1.46093
7	0.01092	-1.07408	1.34859	-1.03840	1.37272
8	0.01238	-1.01550	1.25655	-0.97498	1.28383
9	0.01384	-0.95689	1.16428	-0.91159	1.19475
10	0.01528	-0.89823	1.07208	-0.84826	1.10577
11	0.01669	-0.83950	0.98019	-0.78499	1.01709
12	0.01833	-0.76892	0.87052	-0.70917	0.91126
13	0.01991	-0.69819	0.76178	-0.63351	0.80636
14	0.02142	-0.62727	0.65441	-0.55804	0.70285

67

PHASE V ROTOR

STAGE 5. ROTOR NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0.

SECTION NO 3 SECTION CC RHO 7.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.30023	53.922	0.02049	1.71024
2	-1.24343	54.531	0.02550	1.63138
3	-1.12853	55.574	0.03624	1.46688
4	-1.01194	56.016	0.04727	1.29500
5	-0.89343	56.027	0.05839	1.11888
6	0.76124	55.743	0.07037	0.92347
7	0.61505	55.126	0.08271	0.71072
8	-0.46715	54.052	0.09382	0.50216
9	-0.31805	52.665	0.10327	0.30142
10	-0.16806	51.281	0.11082	0.10969
11	-0.01765	50.263	0.11633	-0.07426
12	0.13282	49.659	0.11973	-0.25313
13	0.28305	49.227	0.12098	-0.42858
14	0.43272	48.922	0.11974	-0.60112
15	0.58155	48.740	0.11431	-0.77123
16	0.72923	48.517	0.10265	-0.93894
17	0.87550	48.074	0.08300	-1.10312
18	1.02021	47.280	0.05389	-1.26209
19	1.13969	46.392	0.02157	-1.38943

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00519	-1.30023	1.71024	53.922
2	0.0250	0.00659	-1.23923	1.62548	54.580
3	0.0500	0.00801	-1.17823	1.53879	55.145
4	0.0750	0.00946	-1.11724	1.45039	55.621
5	0.1000	0.01092	-1.05624	1.36066	55.934
6	0.1250	0.01238	-0.99524	1.27019	56.057
7	0.1500	0.01384	-0.93424	1.17952	56.071
8	0.1750	0.01528	-0.87324	1.08893	56.010
9	0.2000	0.01669	-0.81275	0.99864	55.900
10	0.2300	0.01833	-0.73905	0.89089	55.711
11	0.2600	0.01991	-0.66585	0.78407	55.424
12	0.2900	0.02142	-0.59265	0.67863	55.022
13	0.3200	0.02283	-0.51946	0.57495	54.511
14	0.3500	0.02415	-0.44626	0.47342	53.893
15	0.3800	0.02535	-0.37306	0.37429	53.215
16	0.4100	0.02644	-0.29986	0.27765	52.496
17	0.4400	0.02741	-0.22667	0.18347	51.801

68

PHASE V ROTOR

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0.

SECTION NO 2 SECTION BB RHO 8 0000

CHORD STAGGER CAMBER
3.9139 55.634 4.312

AREA 0.289956 SURFACE ARC LENGTH 7.85816

	ALPHA	UPSILON
SECTION C.G.	-0.01456	-0.04949
STREAMSURFACE SECTION C G	0.01590	-0.04701
BLADE AXIS	-0.01590	-0.04701
STACKING AXIS (RADIAL)	-0.00210	0.

PHASE V ROTOR

STAGE 5 ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 2   SECTION BB   RHO 8.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.01943	-0.52139	0.60793	-0.45692	0.64830
16	0.02052	-0.45675	0.50152	-0.38900	0.54463
17	0.02151	-0.39192	0.39698	-0.32127	0.44279
18	0.02241	-0.32689	0.29449	-0.25374	0.34291
19	0.02322	-0.26168	0.19416	-0.18639	0.24505
20	0.02393	-0.19629	0.09596	-0.11921	0.14914
21	0.02454	-0.13077	-0.00024	-0.05218	0.05494
22	0.02505	-0.06514	-0.09480	0.01475	-0.03795
23	0.02547	0.00061	-0.18813	0.08157	-0.12998
24	0.02579	0.06646	-0.28059	0.14827	-0.22149
25	0.02601	0.13243	-0.37251	0.21486	-0.31279
26	0.02613	0.19854	-0.46409	0.28132	-0.40404
27	0.02615	0.26479	-0.55547	0.34762	-0.49537
28	0.02603	0.33126	-0.64669	0.41372	-0.58688
29	0.02571	0.39803	-0.73772	0.47950	-0.67853
30	0.02514	0.46523	-0.82844	0.54486	-0.77063
31	0.02424	0.53296	-0.91866	0.60969	-0.86286
32	0.02294	0.60133	-1.00824	0.67388	-0.95536
33	0.02117	0.67046	-1.09704	0.73732	-1.04810
34	0.01889	0.74044	-1.18470	0.79990	-1.14077
35	0.01606	0.81131	-1.27068	0.86159	-1.23298
36	0.01255	0.88323	-1.35429	0.92223	-1.32443
37	0.00905	0.94402	-1.42165	0.97190	-1.39982
38	0.00524	0.99807	-1.47935	1.01460	-1.46414
39	0.00524	1.00468	-1.48273	1.01743	-1.47207
40	0.00524	1.01319	-1.48040	1.01319	-1.48040

| LE RAD | 0.01010 | CENTER AT ALPHA | -1.19042 | UPSILON | 1.74202 |
| TE RAD | 0.01123 | CENTER AT ALPHA | 1.00621 | UPSILON | -1.47160 |

70

PHASE V ROTOR

STAGE 5. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0

SECTION NO 2 SECTION BB RHO 8.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.02393	-0.15775	0.12255	55.400
19	0.5000	0.02454	-0.09147	0.02735	54.923
20	0.5300	0.02505	-0.02519	-0.06638	54.563
21	0.5600	0.02547	0.04109	-0.15906	54.312
22	0.5900	0.02579	0.10737	-0.25104	54.157
23	0.6200	0.02601	0.17365	-0.34265	54.078
24	0.6500	0.02613	0.23993	-0.43407	54.042
25	0.6800	0.02615	0.30621	-0.52542	54.037
26	0.7100	0.02603	0.37249	-0.61678	54.045
27	0.7400	0.02571	0.43877	-0.70818	54.050
28	0.7700	0.02514	0.50505	-0.79954	54.024
29	0.8000	0.02424	0.57133	-0.89076	53.973
30	0.8300	0.02294	0.63761	-0.98180	53.911
31	0.8600	0.02117	0.70389	-1.07257	53.795
32	0.8900	0.01889	0.77017	-1.16274	53.542
33	0.9200	0.01606	0.83645	-1.25183	53.138
34	0.9500	0.01255	0.90273	-1.33936	52.562
35	0.9750	0.00905	0.95796	-1.41074	51.947
36	1.0000	0.00524	1.01319	-1.48040	51.209

CHORD	STAGGER	CAMBER
3.9139	55.634	4.312

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0.00504	-1.19614	1.75034	-1.19614	1.75034
2	0.00504	-1.20041	1.74350	-1.18771	1.75175
3	0.00504	-1.19888	1.73651	-1.18180	1.74729
4	0.00619	-1.15096	1.66220	-1.13085	1.67569
5	0.00735	-1.09770	1.57783	-1.07365	1.59363
6	0.00853	-1.04448	1.49175	-1.01640	1.50983
7	0.00972	-0.99128	1.40410	-0.95914	1.42446
8	0.01091	-0.93807	1.31521	-0.90188	1.33786
9	0.01209	-0.88485	1.22537	-0.84463	1.25030
10	0.01326	-0.83161	1.13478	-0.78741	1.16197
11	0.01441	-0.77832	1.04364	-0.73023	1.07309
12	0.01575	-0.71428	0.93400	-0.66171	0.96620
13	0.01704	-0.65013	0.82459	-0.59330	0.85953
14	0.01827	-0.58584	0.71577	-0.52503	0.75372

COORD SYSTEM ORIGIN Z -7.03550 R 0.   STAGE 5. ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 2   SECTION BB   RHO 8.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	1.19614	55.521	0.01972	1.75034
2	-1.14458	56.106	0.02392	1.67441
3	-1.04012	57.130	0.03259	1.51580
4	-0.93390	57.895	0.04152	1.34875
5	-0.82589	58.349	0.05055	1.17498
6	-0.70527	58.520	0.06030	0.97832
7	-0.57160	58.312	0.07037	0.76073
8	-0.43629	57.622	0.07947	0.54420
9	-0.29977	56.580	0.08724	0.33300
10	0.16265	55.475	0.09345	0.12965
11	-0.02539	54.558	0.04804	-0.06610
12	0.11160	54.145	0.10100	-0.25690
13	0.24802	54.021	0.10230	-0.44522
14	0.38343	54.026	0.10173	-0.63187
15	0.51754	54.007	0.09785	-0.81674
16	0.64994	53.878	0.08864	-0.99871
17	0.78021	53.473	0.07239	-1.17632
18	0.90823	52.474	0.04785	-1.34654
19	1.01319	51.209	0.02050	-1.48040

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00504	-1.19614	1.75034	55.521
2	0.0500	0.00619	-1.14091	1.66894	56.144
3	0.0500	0.00735	-1.08568	1.58573	56.701
4	0.0750	0.00853	-1.03044	1.50079	57.220
5	0.1000	0.00972	-0.97521	1.41428	57.646
6	0.1250	0.01091	-0.91997	1.32653	57.960
7	0.1500	0.01209	-0.86474	1.23784	58.207
8	0.1750	0.01326	-0.80951	1.14837	58.403
9	0.2000	0.01441	-0.75427	1.05836	58.512
10	0.2300	0.01575	-0.68799	0.95010	58.514
11	0.2600	0.01704	-0.62171	0.84206	58.417
12	0.2900	0.01827	-0.55543	0.73460	58.236
13	0.3200	0.01943	-0.48915	0.62811	57.944
14	0.3500	0.02052	-0.42287	0.52308	57.529
15	0.3800	0.02151	-0.35659	0.41988	57.039
16	0.4100	0.02241	-0.29031	0.31870	56.499
17	0.4400	0.02322	-0.22403	0.21961	55.945

PHASE V ROTOR

STAGE 5. ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   ETA 0.

SECTION NO 1   SECTION AA   RHO 8.5000

CHORD	STAGGER	CAMBER
3.8302	59.293	1.184

AREA   0.267566   SURFACE ARC LENGTH   7.68670

	ALPHA	UPSILON
SECTION C.G.	-0.02768	-0.04164
STREAMSURFACE SECTION C.G.	-0.02704	-0.04291
BLADE AXIS	-0.02704	-0.04291
STACKING AXIS (RADIAL)	-0.00710	0

.7PC.

STAGE 5. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7 03550 R 0.   MJ 0   ETA 0.

SECTION NO 1   SECTION AA   RHO 8.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0 01817	-0.49606	0.67538	-0.43508	0 70889
16	0 01919	-0.43899	0.56816	-0.37479	0.60394
17	0 02013	-0.38176	0.46263	-0.31467	0 50066
18	0 02160	-0.32438	0.35890	-0.25469	0.39907
19	0 02179	-0.26686	0.25695	-0 19485	0.29914
20	0 02250	-0.20922	0.15695	-0 13514	0.20064
21	0 02313	-0.15146	0.05767	-0.07554	0.10331
22	0 02367	-0.09360	-0.04019	-0.01605	0.06681
23	0 02414	-0.03563	-0.13729	0.04334	-0.08919
24	0 02452	0 02245	-0.23391	0.10261	-0 18496
25	0 02481	0 08066	-0.33027	0.16176	-0 28073
26	0 02502	0 13839	-0 42657	0.22079	-0 37666
27	0 02513	0 19745	-0.52294	0.27968	-0.47288
28	0 02514	0 25611	-0.61937	0.33838	-0 56934
29	0 02499	0 31503	-0.71573	0.39682	-0.66599
30	0 02462	0 37433	-0.81181	0.45487	-0.76274
31	0 02394	0 43415	-0 90736	0.51240	-0.85953
32	0 02285	0 49466	1.00214	0.56925	-0.95635
33	0 02126	0 55599	1.09595	0 62528	1.05315
34	0 01911	0 61825	1 18850	0 68037	1 14977
35	0 01633	0 68155	1 27935	0 73442	1.24590
36	0 01277	0 74613	1.36772	0 78720	1 36117
37	0 00910	0.80101	1 43892	0.83012	1 41976
38	0 00505	0.85035	1 50112	0 86792	1 48948
39	0 00505	0.85630	1 50484	0 86900	1 49651
40	0 00505	0 86446	1 50333	0 86446	1 50333

| LE RAD | 0 00965 | CENTER AT ALPHA | -1 08627 | UPSILON | 1 78172 |
| LE RAD | 0 01058 | CENTER AT ALPHA | 0.85861 | UPSILON | -1.49451 |

74

PHASE V ROTOR

STAGE 5. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. RHO 8.5000 ETA 0

SECTION NO 1 SECTION AA

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA·
18	0.4700	0.02250	-0.17218	0.17862	59.275
19	0.5000	0.02313	-0.11350	0.08049	58.985
20	0.5300	0.02367	-0.05482	-0.01669	58.781
21	0.5600	0.02414	0.00385	-0.11324	58.654
22	0.5900	0.02452	0.06253	-0.20943	58.591
23	0.6200	0.02481	0.12121	-0.30550	58.583
24	0.6500	0.02502	0.17989	-0.40162	58.616
25	0.6800	0.02513	0.23857	-0.49791	58.668
26	0.7100	0.02514	0.29724	-0.59435	58.695
27	0.7400	0.02439	0.35592	-0.69086	58.695
28	0.7700	0.02462	0.41460	-0.78728	58.650
29	0.8000	0.02394	0.47329	-0.88345	58.566
30	0.8300	0.02285	0.53195	-0.97924	58.453
31	0.8600	0.02126	0.59063	-1.07455	58.297
32	0.8900	0.01911	0.64931	-1.16913	58.055
33	0.9200	0.01633	0.70799	-1.26262	57.687
34	0.9500	0.01277	0.76666	-1.35445	57.115
35	0.9750	0.00910	0.81556	-1.42934	56.648
36	1.0000	0.00505	0.86446	-1.50333	56.488

CHORD 7.8302 STAGGER 59.293 CAMBER 1.184

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00492	-1.09146	1.78985	-1.09146	1.78995
2	0.00492	-1.09575	1.78347	-1.08333	1.79092
3	0.00492	-1.03452	1.77673	-1.07785	1.78644
4	0.00597	-1.05228	1.70608	-1.03285	1.71816
5	0.00704	-1.00521	1.62528	-0.98212	1.63922
6	0.00812	-0.95816	1.54243	-0.93137	1.55826
7	0.00921	-0.91113	1.45799	-0.88061	1.47570
8	0.01030	-0.86409	1.37219	-0.82986	1.39178
9	0.01137	-0.81703	1.28525	-0.77911	1.30568
10	0.01244	-0.76996	1.19734	-0.72839	1.22059
11	0.01349	-0.72287	1.10859	-0.67769	1.13362
12	0.01472	-0.66633	1.00103	-0.61687	1.02812
13	0.01592	-0.60970	0.89252	-0.55615	0.92163
14	0.01707	-0.55295	0.78373	-0.49554	0.81504

PHASE V ROTOR

STAGE 5. ROTOR NB 20 ETA 0.

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0 RHO 7.0000

SECTION NO 4 SECTION DD

MEANLINE INPUT DATA

PT	ALPHA	ZETA.	THICKNESS	UPSILON
1	1.39014	52.582	0.02080	1.64232
2	1.32877	53.126	0.02750	1.56135
3	-1.20477	53.933	0.04157	1.39339
4	-1.07906	54.151	0.05627	1.21990
5	-0.95168	53.787	0.07115	1.04464
6	0.80989	53.005	0.08720	0.85359
7	0.65330	51.831	0.10372	0.64989
8	-0.49503	50.259	0.11853	0.45394
9	0.33535	48.549	0.13124	0.26769
10	0.17482	47.070	0.14140	0.09073
11	-0.01364	45.876	0.14887	-0.07888
12	0.14793	44.904	0.15345	-0.24265
13	0.30964	44.047	0.15493	-0.40141
14	0.47125	43.329	0.15245	-0.55575
15	0.63258	42.758	0.14399	-0.70643
16	0.79356	42.163	0.12759	-0.85376
17	0.95389	41.448	0.10139	-0.99726
18	1.11364	40.647	0.06368	-1.13632
19	1.24623	39.930	0.02218	-1.24892

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA.
1	0.0250	0.00531	-1.39014	1.64232	52.582
2	0.0500	0.00716	-1.32423	1.55530	53.145
3	0.0500	0.00905	-1.25832	1.46653	53.638
4	0.0750	0.01099	-1.19241	1.37643	53.968
5	0.1000	0.01296	-1.12650	1.28551	54.123
6	0.1250	0.01494	-1.06059	1.19437	54.102
7	0.1500	0.01691	-0.99468	1.10354	53.947
8	0.1750	0.01886	-0.92877	1.01342	53.674
9	0.2000	0.02078	-0.86287	0.92433	53.329
10	0.2300	0.02302	-0.78377	0.81902	52.836
11	0.2600	0.02517	-0.70468	0.71575	52.252
12	0.2900	0.02721	-0.62559	0.61481	51.574
13	0.3200	0.02913	-0.54650	0.51645	50.804
14	0.3500	0.03091	-0.46741	0.42090	49.947
15	0.3800	0.03254	-0.38832	0.32824	49.096
16	0.4100	0.03401	-0.30923	0.23825	48.286
17	0.4400	0.03532	-0.23014	0.15068	47.544

PHASE V ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0

STAGE 5. ROTOR   NB 20

SECTION NO 4   SECTION DD   MU 0.   RHO 7.0000   ETA 0

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA·
18	0.4700	0.03646	-0.15105	0.06525	46.881
19	0.5000	0.03744	-0.07195	-0.01832	46.285
20	0.5300	0.03824	0.00714	-0.10026	45.753
21	0.5600	0.03886	0.08623	-0.18076	45.265
22	0.5900	0.03930	0.16532	-0.25995	44.812
23	0.6200	0.03955	0.24441	0.33794	44.386
24	0.6500	0.03959	0.32350	-0.41481	43.984
25	0.6800	0.03939	0.40259	-0.49065	43.620
26	0.7100	0.03887	0.48168	-0.56559	43.303
27	0.7400	0.03798	0.56077	-0.63975	43.010
28	0.7700	0.03666	0.63987	-0.71316	42.727
29	0.8000	0.03484	0.71896	-0.78586	42.444
30	0.8300	0.03246	0.79805	-0.85782	42.154
31	0.8600	0.02945	0.87714	-0.92903	41.824
32	0.8900	0.02580	0.95623	-0.99932	41.426
33	0.9200	0.02144	1.03532	-1.06861	41.023
34	0.9500	0.01622	1.11441	-1.13699	40.673
35	0.9750	0.01113	1.18032	-1.19332	40.353
36	1.0000	0.00567	1.24623	-1.24892	39.930

CHORD 3.9128   STAGGER 47.640   CAMBER 12.652

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00531	-1.39014	1.64232	-1.39014	1.64232
2	0.00531	-1.39430	1.63485	-1.38168	1.64435
3	0.00531	-1.39236	1.62755	-1.37530	1.64059
4	0.00716	-1.33543	1.54690	-1.31303	1.54770
5	0.00905	-1.27258	1.45604	-1.24406	1.47703
6	0.01099	-1.20980	1.36378	-1.17502	1.38907
7	0.01296	-1.14704	1.27065	-1.10596	1.30036
8	0.01494	-1.08426	1.17724	-1.03692	1.21150
9	0.01691	-1.02143	1.08407	-0.96794	1.12300
10	0.01886	-0.95850	0.99156	-0.89905	1.03528
11	0.02078	-0.89547	0.90005	-0.83026	0.94860
12	0.02302	-0.81966	0.79182	-0.74789	0.84623
13	0.02517	-0.74362	0.68561	-0.66575	0.74590
14	0.02721	-0.66730	0.58172	-0.58389	0.64789

77

PHASE V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0.

SECTION NO 4 SECTION DD RHO 7.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.02913	-0.59067	0.48043	-0.50233	0.55246
16	0.03091	-0.51370	0.38199	-0.42112	0.45982
17	0.03254	-0.43643	0.28655	-0.34021	0.36992
18	0.03401	-0.35889	0.19397	-0.25956	0.28252
19	0.03532	-0.28112	0.10404	-0.17916	0.19733
20	0.03646	-0.20312	0.01650	-0.09897	0.11401
21	0.03744	-0.12489	-0.06894	-0.01901	0.03230
22	0.03824	-0.04645	-0.15246	0.06073	-0.04806
23	0.03886	0.03222	-0.23477	0.14073	-0.12725
24	0.03930	0.11113	-0.31449	0.21950	-0.20541
25	0.03955	0.19029	-0.39323	0.29853	-0.28265
26	0.03959	0.26977	-0.47053	0.37729	-0.35908
27	0.03939	0.34943	0.54643	0.45575	-0.43487
28	0.03887	0.42952	-0.62094	0.53384	-0.51075
29	0.03798	0.51009	-0.69409	0.61146	-0.58541
30	0.03666	0.59120	-0.76585	0.68853	-0.66048
31	0.03484	0.67296	-0.83615	0.76495	-0.73556
32	0.03246	0.75543	-0.90490	0.84066	-0.81075
33	0.02945	0.83872	-0.97196	0.91556	-0.88609
34	0.02580	0.92284	-1.03716	0.98962	-0.96148
35	0.02144	1.00778	-1.10026	1.06286	-1.03696
36	0.01622	1.09373	-1.16105	1.13509	-1.11292
37	0.01113	1.16622	1.20997	1.19442	1.17673
38	0.00567	1.22977	1.25141	1.24582	1.23229
39	0.00567	1.23765	1.25337	1.24913	1.23983
40	0.00567	1.24623	1.24892	1.24623	1.24892

LF RAD 0.01074 CENTER AT ALPHA -1.38361 UPSILON 1.63379
TF RAD 0.01258 CENTER AT ALPHA 1.23659 UPSILON -1.24084

.75C.

STAGE 5. ROTOR   NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   ETA 0.

SECTION NO 4   SECTION DD   RHO 7.0000

CHORD	STAGGER	CAMBER
3.0128	47.640	12.652

AREA 0.419325   SURFACE ARC LENGTH   7.88478

	ALPHA	UPSILON
SECTION C.G.	-0.00357	-0.03695
STREAMSURFACE SECTION C.G.	-0.02735	-0.02172
BLADE AXIS	-0.02735	-0.02172
STACKING AXIS (RADIAL)	-0.00210	0

PHASE V ROTOR

STAGE 5. ROTOR NB 20 ETA 0.

COORD SYSTEM ORIGIN Z -7.03550 R 0 MU 0. RHO 6.5000

SECTION NO 5 SECTION FE

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46708	51.372	0.02070	1.55249
2	-1.40196	51.742	0.02986	1.47035
3	-1.27043	52.200	0.04902	1.30186
4	-1.13736	52.077	0.06890	1.13030
5	-1.00274	51.39R	0.08889	0.95933
6	-0.85295	50.317	0.11027	0.77509
7	-0.68762	48.715	0.13210	0.58110
8	-0.52075	46.394	0.15155	0.39836
9	-0.35260	43.851	0.16797	0.22963
10	-0.18340	41.779	0.18110	0.07328
11	0.01338	40.202	0.19074	0.07416
12	0.15727	38.955	0.19659	-0.21494
13	0.32840	37.871	0.19830	-0.35041
14	0.49990	36.891	0.19446	-0.48114
15	0.67162	35.987	0.18277	-0.60769
16	0.84358	35.125	0.16092	-0.73025
17	1.01576	34.148	0.12655	-0.84893
18	1.18326	32.797	0.07712	-0.96261
19	1.33224	31.426	0.02260	-1.05267

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00541	-1.46708	1.55249	51.372
2	0.0500	0.00799	-1.39710	1.46417	51.801
3	0.0500	0.01063	-1.32712	1.37478	52.066
4	0.0750	0.01334	-1.25713	1.28471	52.222
5	0.1000	0.01607	-1.18715	1.19438	52.212
6	0.1250	0.01881	-1.11717	1.10440	52.010
7	0.1500	0.02153	-1.04718	1.01530	51.679
8	0.1750	0.02422	-0.97720	0.92742	51.243
9	0.2000	0.02685	-0.90722	0.84100	50.744
10	0.2300	0.02990	-0.82324	0.73942	50.072
11	0.2600	0.03282	-0.73926	0.64046	49.263
12	0.2900	0.03559	-0.65528	0.54456	48.291
13	0.3200	0.03817	-0.57130	0.4521:4	47.153
14	0.3500	0.04055	-0.48732	0.36360	45.857
15	0.3800	0.04272	-0.40334	0.27899	44.576
16	0.4100	0.04467	-0.31936	0.19798	43.373
17	0.4400	0.04640	-0.23538	0.12013	42.314

PHASE V ROTOR

·ZPC·

STAGE   5.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   RHO 6.5000   ETA 0

SECTION NO 5   SECTION FE

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.04791	-0.15140	0.04489	41.423
19	0.5000	0.04918	-0.06742	-0.02817	40.634
20	0.5300	0.05022	0.01656	-0.09933	39.932
21	0.5600	0.05101	0.10054	-0.16883	39.301
22	0.5900	0.05156	0.18452	-0.23687	38.736
23	0.6200	0.05184	0.26850	-0.30359	38.197
24	0.6500	0.05182	0.35248	-0.36905	37.672
25	0.6800	0.05143	0.43646	-0.43331	37.183
26	0.7100	0.05061	0.52044	-0.49649	36.734
27	0.7400	0.04927	0.60442	-0.55866	36.291
28	0.7700	0.04736	0.68840	-0.61983	35.837
29	0.8000	0.04481	0.77238	-0.67998	35.399
30	0.8300	0.04153	0.85636	-0.73921	34.986
31	0.8600	0.03746	0.94034	-0.79750	34.529
32	0.8900	0.03255	1.02432	-0.85471	33.984
33	0.9200	0.02675	1.10830	-0.91066	33.348
34	0.9500	0.01981	1.19228	-0.96518	32.6??
35	0.9750	0.01309	1.26226	-1.00943	32.000
36	1.0000	0.00591	1.33224	-1.05267	31.426

CHORD   STAGGER   CAMBER
3.8240   42.942   19.946

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00541	-1.46708	1.55249	-1.46708	1.55249
2	0.00541	-1.47112	1.54491	-1.45870	1.55472
3	0.00541	-1.46908	1.53767	-1.45219	1.55114
4	0.00799	-1.40911	1.45472	-1.38510	1.47362
5	0.01063	-1.34315	1.36228	-1.31108	1.38728
6	0.01334	-1.27729	1.26909	-1.23698	1.30033
7	0.01607	-1.21143	1.17556	-1.16287	1.21321
8	0.01981	-1.14551	1.08227	-1.08883	1.12654
9	0.02153	-1.07948	0.98977	-1.01489	1.04083
10	0.02422	-1.01331	0.89843	-0.94109	0.95641
11	0.02685	-0.94697	0.80852	-0.86747	0.87348
12	0.02990	-0.86708	0.70273	-0.79939	0.77612
13	0.03282	-0.78681	0.59950	-0.69170	0.68142
14	0.03559	-0.70608	0.49928	-0.60448	0.58983

81

PHASE V ROTOR

STAGE 5 ROTOR NB 20 ETA 0.

COORD SYSTEM ORIGIN Z -7.03550 R 0 MU 0 ETA 0.

SECTION NO 5 SECTION EE RHO 6.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.03817	-0.62481	0.40251	-0.51779	0.50178
16	0.04055	-0.54296	0.30959	-0.43168	0.41760
17	0.04272	-0.46067	0.22080	-0.34601	0.33717
18	0.04467	-0.37801	0.13590	-0.26071	0.26006
19	0.04640	-0.29510	0.05452	-0.17566	0.18573
20	0.04791	-0.21200	-0.02379	-0.09080	0.11357
21	0.04918	-0.12866	-0.09953	-0.00618	0.04320
22	0.05022	-0.04508	-0.17296	0.07819	-0.02570
23	0.05101	0.03876	-0.24431	0.16232	-0.09336
24	0.05156	0.12283	-0.31377	0.24620	-0.15998
25	0.05184	0.20721	-0.38149	0.32979	-0.22570
26	0.05182	0.29193	-0.44746	0.41302	-0.29063
27	0.05143	0.37703	-0.51165	0.49589	-0.35497
28	0.05061	0.46257	-0.57404	0.57831	-0.41895
29	0.04927	0.54866	-0.63460	0.66018	-0.48273
30	0.04736	0.63538	-0.69324	0.74142	-0.54641
31	0.04481	0.72275	-0.74983	0.82201	-0.61014
32	0.04153	0.81083	-0.80426	0.90189	-0.67415
33	0.03746	0.89974	-0.85650	0.98093	-0.73849
34	0.03255	0.98957	-0.90632	1.05911	-0.80309
35	0.02675	1.08018	-0.95339	1.13641	-0.86794
36	0.01981	1.17186	-0.99708	1.21269	-0.93328
37	0.01309	1.24899	-1.03066	1.27552	-0.98820
38	0.00591	1.31584	-1.05810	1.32963	-1.03561
39	0.00591	1.32413	-1.05865	1.33393	-1.04295
40	0.00591	1.33224	-1.05267	1.33224	-1.05267

LE RAD	0.01081	CENTER AT ALPHA	-1.46034	UPSILON	1.54404
TE RAD	0.01338	CENTER AT ALPHA	1.32083	UPSILON	-1.04568

82

PHASE V ROTOR

STAGE   5.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   RHO 6.5000   ETA 0.

SECTION NO   5   SECTION FE   RHO   6.5000

CHORD   STAGGER   CAMBER
7.8240   42.942   19.946

AREA   0.516253   SURFACE ARC LENGTH   7.74257

	ALPHA	UPSILON
SECTION C.G.	-0.00538	-0.01698
SURFACE SURFACE SECTION C.G.	-0.03739	-0.00755
BLADE AXIS	-0.03739	-0.00755
STACKING AXIS (RADIAL)	-0.00210	0.

83

PHASE V ROTOR

STAGE 5 ROTOR NE 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0.

SECTION NO 6 SECTION FF RHO 6.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	1.53280	50.437	0.01987	1.44767
2	1.46439	50.649	0.03189	1.36461
3	-1.32630	50.825	0.05675	1.19563
4	1.18668	50.403	0.08212	1.02534
5	-1.04556	49.288	0.10716	0.85779
6	0.88863	47.390	0.13340	0.68108
7	-0.71589	44.659	0.15951	0.50142
8	0.54153	41.692	0.18232	0.33765
9	-0.36594	39.083	0.20139	0.18820
10	-0.18921	37.000	0.21644	0.04983
11	-0.01178	35.232	0.22718	-0.08004
12	0.16657	33.646	0.23328	-0.20269
13	0.34556	32.136	0.23413	-0.31894
14	0.52520	30.602	0.22789	-0.42906
15	0.70548	28.962	0.21239	-0.53291
16	0.88652	27.157	0.18534	-0.63019
17	1.06845	25.120	0.14421	-0.72029
18	1.25160	22.819	0.08613	-0.80232
19	1.40510	20.698	0.02262	-0.86394

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00531	1.53280	1.44767	50.437
2	0.0500	0.00877	1.45936	1.35848	50.630
3	0.0500	0.01229	1.38591	1.26870	50.776
4	0.0750	0.01585	1.31246	1.17866	50.798
5	0.1000	0.01943	1.23901	1.08885	50.625
6	0.1250	0.02299	1.16557	0.99988	50.265
7	0.1500	0.02649	1.09212	0.91232	49.721
8	0.1750	0.02991	1.01867	0.82671	48.996
9	0.2000	0.03322	0.94522	0.74346	48.144
10	0.2300	0.03702	0.85709	0.64703	46.965
11	0.2600	0.04062	0.76895	0.55478	45.611
12	0.2900	0.04398	0.68081	0.46707	44.085
13	0.3200	0.04709	0.59267	0.38394	42.574
14	0.3500	0.04993	0.50454	0.30499	41.142
15	0.3800	0.05252	0.41640	0.22977	39.831
16	0.4100	0.05483	0.32826	0.15779	38.665
17	0.4400	0.05686	0.24013	0.08860	37.619

PHASE V ROTOR

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   RHO 6.0000   ETA 0

SECTION NO 6   SECTION FF

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA.
18	0.4700	0.05860	-0.15199	0.02183	36.692
19	0.5000	0.06005	0.06385	-0.04280	35.817
20	0.5300	0.06121	0.02428	-0.10543	34.984
21	0.5600	0.06205	0.11242	-0.16620	34.198
22	0.5900	0.06257	0.20056	-0.22527	33.460
23	0.6200	0.06273	0.28870	-0.28272	32.731
24	0.6500	0.06249	0.37683	-0.33858	32.000
25	0.6800	0.06177	0.46497	-0.39286	31.258
26	0.7100	0.06050	0.55311	-0.44557	30.500
27	0.7400	0.05861	0.64124	-0.49669	29.715
28	0.7700	0.05605	0.72938	-0.54617	28.897
29	0.8000	0.05274	0.81752	-0.59397	28.042
30	0.8300	0.04861	0.90566	-0.64004	27.146
31	0.8600	0.04357	0.99379	-0.68431	26.175
32	0.8900	0.03760	1.08193	-0.72664	25.110
33	0.9200	0.03062	1.17007	-0.76691	23.998
34	0.9500	0.02237	1.25820	-0.80511	22.867
35	0.9750	0.01447	1.33165	-0.83533	21.845
36	1.0000	0.00605	1.40510	-0.86394	20.698

CHORD 2.7383   STAGGER 38.197   CAMBER 29.739

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00531	-1.53280	1.44767	-1.53280	1.44767
2	0.00531	-1.53659	1.44027	-1.52478	1.44999
3	0.00531	-1.53456	1.43335	-1.51840	1.44670
4	0.00877	-1.47203	1.34808	-1.44669	1.36888
5	0.01229	-1.40370	1.25418	-1.36811	1.28323
6	0.01585	-1.33542	1.15993	-1.28950	1.19740
7	0.01943	-1.26709	1.06581	-1.21094	1.11190
8	0.02299	-1.19861	0.97241	-1.13253	1.02734
9	0.02649	-1.12989	0.88031	-1.05435	0.94433
10	0.02991	-1.06086	0.79003	-0.97648	0.86339
11	0.03322	-0.99147	0.70203	-0.89898	0.78489
12	0.03702	-0.90767	0.59980	-0.80650	0.69476
13	0.04062	-0.82320	0.50167	-0.71470	0.60789
14	0.04398	-0.73800	0.40803	-0.62362	0.52612

PHASE V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0.

SECTION NO 6 SECTION FF RHO 6.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0.04709	-0.65222	0.31913	-0.53313	0.44875
16	0.04993	-0.56594	0.23470	-0.44313	0.37528
17	0.05252	-0.47928	0.15439	-0.35353	0.30515
18	0.05483	-0.39229	0.07778	-0.26424	0.23781
19	0.05686	-0.30500	0.00443	-0.17526	0.17278
20	0.05860	-0.21744	-0.06600	-0.08654	0.10966
21	0.06005	-0.12954	-0.13383	0.00184	0.04822
22	0.06121	-0.04131	-0.19916	0.08988	-0.01170
23	0.06205	0.04724	-0.26212	0.17760	-0.07028
24	0.06257	0.13608	-0.32283	0.26504	-0.12771
25	0.06273	0.22529	-0.38136	0.35210	-0.18107
26	0.06249	0.31494	-0.43763	0.43873	-0.23952
27	0.06177	0.40506	-0.49156	0.52488	-0.29417
28	0.06050	0.49572	-0.54300	0.61050	-0.34814
29	0.05861	0.58694	-0.59183	0.69555	-0.40154
30	0.05605	0.67875	-0.63789	0.78001	-0.45445
31	0.05274	0.77117	-0.68098	0.86387	-0.50696
32	0.04861	0.86420	-0.72089	0.94711	-0.55920
33	0.04357	0.95787	-0.75739	1.02971	-0.61123
34	0.03760	1.05210	-0.79028	1.11176	-0.66299
35	0.03062	1.14679	-0.81920	1.19335	-0.71462
36	0.02237	1.24196	-0.84364	1.27445	-0.76658
37	0.01447	1.32159	-0.86043	1.34171	-0.81024
38	0.00605	1.38989	-0.87268	1.39957	-0.84735
39	0.00605	1.39810	-0.87153	1.40507	-0.85403
40	0.00605	1.40510	-0.86394	1.40510	-0.86394

LE RAD 0.01050 CENTER AT ALPHA -1.52611 UPSILON 1.43958
TE RAD 0.01383 CENTER AT ALPHA 1.39217 UPSILON -0.85903

PHASE V ROTOR

STAGE 5. ROTOR   NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0   MU 0.   ETA 0.

SECTION NO 6   SECTION FF   RHO   6.0000

CHORD   STAGGER   CAMBER
3.7383   38.197   29.739

AREA 0.596107   SURFACE ARC LENGTH 7.62101

                              ALPHA   UPSILON
SECTION C.G.   -0.01668   -0.00549
SURFAMSURFACE SECTION C.G   -0.05114   0.00166
BLADE AXIS   -0.05114   -0.00166
STACKING AXIS (RADIAL)   -0.00210   0.

87

+ZPC+

STAGE 5 ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0.   NB 20   MU 0.   ETA 0.

SECTION NO 7   SECTION GG   RHO 5.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58170	49.153	0.01885	1.32741
2	-1.50965	49.193	0.03348	1.24375
3	-1.36416	48.996	0.06339	1.07521
4	-1.21686	48.141	0.09355	0.90759
5	-1.06785	46.504	0.12305	0.74546
6	-0.90245	43.893	0.15365	0.57843
7	-0.72050	40.531	0.18373	0.41343
8	-0.53740	37.589	0.20973	0.26540
9	-0.35336	35.115	0.23121	0.13038
10	0.16859	32.723	0.24770	0.00661
11	0.01676	30.400	0.25866	-0.10673
12	0.20282	28.063	0.26361	-0.21029
13	0.38937	25.555	0.26176	-0.30398
14	0.57652	22.717	0.25159	-0.38734
15	0.76424	19.444	0.23158	-0.45929
16	0.95269	15.918	0.20008	-0.51889
17	1.14181	12.231	0.15485	-0.56615
18	1.33143	8.224	0.09199	-0.60052
19	1.48952	4.381	0.02145	-0.61826

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00518	-1.58170	1.32741	49.153
2	0.0250	0.00947	-1.50492	1.23825	49.300
3	0.0500	0.01381	-1.42814	1.14913	49.194
4	0.0750	0.01816	-1.35136	1.06047	49.004
5	0.1000	0.02250	-1.27458	0.97265	48.630
6	0.1250	0.02679	-1.19780	0.88635	48.011
7	0.1500	0.03100	-1.12102	0.80221	47.195
8	0.1750	0.03509	-1.04423	0.72069	46.195
9	0.2000	0.03904	-0.96745	0.64222	45.019
10	0.2300	0.04357	-0.87532	0.55257	43.374
11	0.2600	0.04781	-0.78318	0.46808	41.662
12	0.2900	0.05177	-0.69104	0.38850	39.970
13	0.3200	0.05542	-0.59891	0.31340	38.430
14	0.3500	0.05876	0.50677	0.24206	37.096
15	0.3800	0.06178	-0.41464	0.17397	35.837
16	0.4100	0.06445	-0.32250	0.10892	34.613
17	0.4400	0.06678	-0.23036	0.04674	33.410

PHASE V ROTOR

STAGE 5. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03550 R O MU O. RHO 5.5000 ETA O.

SECTION NO 7 SECTION GG

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
18	0 4700	0.06873	-0.13823	-0.01268	32.228
19	0 5000	0.07030	-0.04609	-0.06946	31.060
20	0 5300	0.07147	0.04605	-0.12370	29.905
21	0 5600	0.07223	0 13818	-0.17545	28.737
22	0 5900	0.07256	0.23032	-0.22474	27.547
23	0 6200	0.07242	0.32246	-0.27156	26.313
24	0 6500	0.07176	0.41459	-0.31585	26.026
25	0 6800	0 07054	0.50673	-0 35755	23.658
26	0 7100	0.06870	0 59887	-0.39654	22.195
27	0 7400	0 06619	0 69100	-0.43269	20.625
28	0 7700	0 06298	0 78314	-0 46584	18.940
29	0 8000	0.05901	0 87528	-0.49593	17.228
30	0 8300	0.05421	0.96741	-0.52301	15.534
31	0 8600	0.04849	1.05955	-0.54714	13 804
32	0 8900	0.04183	1.15169	-0.56827	12.009
33	0 9200	0.03409	1.24382	-0.58631	10.135
34	0 9500	0 02480	1 33596	-0.60117	8.173
35	0.9750	0.01570	1.41274	-0.61100	6.386
36	1.0000	0.00590	1.48952	-0.61826	4.381

CHORD
3 6357

STAGGER
32.355

CAMBER
44 772

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0.00518	-1.58170	1.32741	-1.58170	1.32741
2	0 00518	-1.58518	1.32027	-1.57413	1 32980
3	0 00518	-1.58316	1.31373	-1.56795	1 32684
4	0.00947	-1.51797	1.22702	-1.49186	1.24948
5	0 01381	-1 44714	1.13273	-1.40914	1.16553
6	0 01816	-1 37628	1.03P81	-1.32644	1 08213
7	0 02250	-1.30527	0.94561	-1.24388	0.99968
8	0 02679	-1.23399	0.85377	-1 16160	0.91892
9	0 03100	-1.16235	0.76392	-1.07968	0.84049
10	0 03509	-1.09027	0.67654	-0.99820	0.76485
11	0 03904	-1.01766	0.59205	-0.91725	0 69240
12	0 04357	-0.92971	0.49500	-0 82093	0.61013
13	0 04781	-C 84096	0 40314	-0.72541	0 53301
14	0 05177	-0 75150	0 31638	-0 63059	0 46063

STAGE 5 ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   NR 20   ETA 0.

SECTION NO 7   SECTION GG   RHO 5.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.05542	-0.66153	0.23448	-0.53629	0.39232
16	0.05876	-0.57120	0.15686	-0.44234	0.32726
17	0.06178	-0.48038	0.08293	-0.34889	0.26501
18	0.06445	-0.38905	0.01249	-0.25595	0.20534
19	0.06678	-0.29720	-0.05459	-0.16352	0.14807
20	0.06873	-0.20486	-0.11837	-0.07159	0.09302
21	0.07030	-0.11202	-0.17893	0.01985	0.04001
22	0.07147	-0.01873	-0.23632	0.11082	-0.01107
23	0.07223	0.07505	-0.29058	0.20131	-0.06032
24	0.07256	0.16932	-0.34169	0.29132	-0.10780
25	0.07242	0.26410	-0.38956	0.38081	-0.15355
26	0.07176	0.35941	-0.43406	0.46978	-0.19764
27	0.07054	0.45528	-0.47500	0.55818	-0.24010
28	0.06870	0.55169	-0.51216	0.64604	-0.28092
29	0.06619	0.64862	-0.54530	0.73338	-0.32008
30	0.06298	0.74598	-0.57413	0.82030	-0.35756
31	0.05901	0.84350	-0.59839	0.90705	-0.39347
32	0.05421	0.94102	-0.61795	0.99380	-0.42808
33	0.04849	1.03852	-0.63275	1.08058	-0.46154
34	0.04183	1.13586	-0.64265	1.16751	-0.49389
35	0.03409	1.23292	-0.64732	1.25473	-0.52531
36	0.02480	1.32955	-0.64580	1.34237	-0.55655
37	0.01570	1.40957	-0.63936	1.41591	-0.58265
38	0.00590	1.47801	-0.63058	1.48070	-0.60431
39	0.00590	1.48505	-0.62728	1.48698	-0.60924
40	0.00590	1.48952	-0.61826	1.48352	-0.61826

			UPSILON		UPSILON
LE RAD 0.01007		CENTER AT ALPHA	-1.57512		1.31978
TE RAD 0.01354		CENTER AT ALPHA	1.47602		-0.61719

90

PHASE V ROTOR

STAGE 5 ROTOR NB 20 ETA 0.

COORD SYSTEM ORIGIN 7 -7 03550 R 0. MU 0 RHO 5.5000

SECTION NO 7   SECTION GG

CHORD	STAGGER	CAMBER
3 6357	32 355	44.772

AREA 0 656981   SURFACE ARC LENGTH 7 51481

	ALPHA	UPSILON
SECTION C.G	0 01411	-0 00097
STREAMSURFACE SECTION C G.	0 04600	-0 01576
BLADE AXIS	-0.04603	-0 01576
STACKING AXIS (RADIAL)	-0 00210	0

91

PHASE V ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0.   STAGE 5. ROTOR   MU 0   NB 20   ETA 0

SECTION NO 8   SECTION HH   RHO 5.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	*UPSILON
1	1.59027	47.285	0.01944	1.18793
2	-1.51320	47.101	0.03669	1.10485
3	1.35817	46.453	0.07156	0.93999
4	-1.20233	45.242	0.10601	0.77953
5	-1.04599	43.375	0.13892	0.62711
6	0.87373	40.647	0.17213	0.47215
7	-0.68577	37.279	0.20380	0.30035
8	-0.49799	34.057	0.23028	0.18563
9	-0.31027	30.994	0.25160	0.06573
10	-0.12274	28.012	0.26794	-0.04073
11	-0.06444	24.939	0.27949	-0.13463
12	0.25134	21.658	0.28644	-0.21586
13	0.43784	18.221	0.28833	-0.28433
14	0.62364	14.624	0.28791	-0.33991
15	0.80826	10.868	0.26633	-0.38235
16	0.99125	6.653	0.23347	-0.41110
17	1.17130	1.116	0.17895	-0.42383
18	1.34660	-6.850	0.10150	-0.41583
19	1.48772	-16.226	0.02849	-0.38711

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00562	-1.59027	1.18793	47.285
2	0.0250	0.01060	-1.51332	1.10497	47.039
3	0.0500	0.01561	-1.43637	1.02268	46.781
4	0.0750	0.02062	-1.35942	0.94130	46.402
5	0.1000	0.02558	-1.28247	0.86118	45.881
6	0.1250	0.03046	-1.20552	0.78274	45.193
7	0.1500	0.03573	-1.12857	0.70637	44.346
8	0.1750	0.03985	-1.05162	0.63242	43.351
9	0.2000	0.04428	-0.97467	0.56117	42.219
10	0.2300	0.04933	-0.88233	0.47953	40.709
11	0.2600	0.05405	-0.78999	0.40731	39.091
12	0.2900	0.05841	-0.69765	0.32943	37.469
13	0.3200	0.06241	-0.60531	0.26069	35.866
14	0.3500	0.06605	-0.51297	0.19581	34.320
15	0.3800	0.06932	-0.42063	0.13453	32.822
16	0.4100	0.07224	-0.32830	0.07664	31.339
17	0.4400	0.07481	-0.23596	0.02202	29.877

PHASE V ROTOR

	STAGE 5 ROTOR	NB 20	FIA O
COORD SYSTEM ORIGIN Z -7.03550 R O		MU O.	
SECTION NO 8	SECTION HH	RHO 5.0000	

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA
18	0.4700	0.07704	-0.14362	-0.02950	28.440
19	0.5000	0.07893	-0.05128	-0.07804	27.001
20	0.5300	0.08049	0.04106	-0.12358	25.492
21	0.5600	0.08173	0.13340	-0.16607	23.917
22	0.5900	0.08265	0.22574	-0.20549	22.301
23	0.6200	0.08323	0.31808	-0.24182	20.643
24	0.6500	0.08342	0.41042	-0.27506	18.942
25	0.6800	0.08313	0.50276	-0.30519	17.196
26	0.7100	0.08224	0.59510	-0.33220	15.395
27	0.7400	0.08061	0.68744	-0.35603	13.539
28	0.7700	0.07804	0.77978	-0.37665	11.624
29	0.8000	0.07434	0.87212	-0.39399	9.608
30	0.8300	0.06928	0.96446	-0.40780	7.365
31	0.8600	0.06262	1.05680	-0.41773	4.841
32	0.8900	0.05411	1.14914	-0.42323	1.913
33	0.9200	0.04353	1.24148	-0.42359	-1.639
34	0.9500	0.03118	1.33382	-0.41733	-6.308
35	0.9750	0.01993	1.41077	-0.40569	-10.983
36	1.0000	0.00824	1.48772	-0.38711	-16.226

CHORD	STAGGER	CAMBER
3.4576	27.099	63.511

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00562	-1.59027	1.18793	-1.59027	1.18793
2	0.00562	-1.59364	1.18039	-1.58256	1.19070
3	0.00562	-1.59136	1.17372	-1.57602	1.18792
4	0.01060	-1.52674	1.09248	-1.49990	1.11746
5	0.01561	-1.45604	1.00420	-1.41670	1.04116
6	0.02062	-1.38523	0.91673	-1.33361	0.96588
7	0.02558	-1.31421	0.83040	-1.25073	0.89197
8	0.03046	-1.24288	0.74563	-1.16816	0.81985
9	0.03523	-1.17114	0.66282	-1.08600	0.74932
10	0.03985	-1.09891	0.58232	-1.00433	0.68251
11	0.04428	-1.02612	0.50447	-0.92323	0.61787
12	0.04933	-0.93796	0.41488	-0.82671	0.54418
13	0.05405	-0.84831	0.32979	-0.73108	0.47483
14	0.05841	-0.75908	0.24929	-0.63623	0.40957

93

PHASE V ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R O   STAGE 5 ROTOR   NB 20   MU 0.   ETA 0.

SECTION NO 8   SECTION HH   RHO 5.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
15	0 06241	-0.66853	0.17325	-0.54210	0 34812
16	0 06605	-0.57735	0.10151	-0.44860	0 29011
17	0 06932	-0.48559	0.03382	-0.35568	0.23523
18	0 07224	-0.39325	-0.03002	-0.26334	0 18331
19	0 07181	-0.30038	-0 09012	-0.17153	0 13416
20	0 07704	-0.20704	-0.14661	-0.08019	0.08761
21	0 07893	-0.11323	-0.19961	0.01067	0.04354
22	0 08049	-0.01882	-0.24918	0.10095	0.00202
23	0 08173	0 07612	-0.29523	0.19069	-0 03691
24	0.08265	0.17152	-0.33768	0.27996	-0.07329
25	0.08323	0.26735	-0.37647	0.36881	-0.10716
26	0.08342	0.36361	-0.41146	0.45724	-0.13865
27	0.08313	0.46027	-0.44249	0 54575	-0.16790
28	0 08224	0.55735	-0.46928	0.63285	-0.19512
29	0.09061	0.65482	-0.49151	0.72006	0.22055
30	0 07804	0.75260	-0.50880	0.80696	-0.24450
31	0 07434	0.85067	-0.5207C	0 89357	-0.26727
32	0 06928	0.94910	-0.5265	0.97981	-0.28902
33	0 06262	1.04766	-0 52560	1 06593	-0.30985
34	0 05411	1.14601	-0.51672	1 15226	-0 39975
35	0.04353	1.24363	-0 49881	1 23933	-0.34838
36	0.03118	1.33974	-0.47090	1.32790	-0.36376
37	0.01993	1.41733	-0.43951	1.40420	0 37187
38	0 00824	1.47905	-0 40802	1.46985	-0.37376
39	0.00824	1.48590	-0.40130	1.48097	-0.37734
40	0 00824	1.48772	-0.3871·	1.48772	-0 38711

| LE RAD | 0 01048 | CENTER AT ALPHA | -1.58315 | UPSILON | 1.18024 |
| TE RAD | 0 01831 | CENTER AT ALPHA | 1 47009 | UPSILON | -0 39206 |

94

'766

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. ETA 0.

SECTION NO 8 SECTION HH RHO 5.0000

CHORD 3.4576 STAGGER 27.099 CAMBER 63.511

AREA 0.701672 SURFACE ARC LENGTH 7.27336

	ALPHA	UPSILON
SECTION C.G.	0.01262	-0.00851
STREAMSURFACE SECTION C.G.	0.00325	-0.03786
BLADE AXIS	0.00325	0.03786
STACKING AXIS (RADIAL)	-0.00210	0

PHASE V ROTOR

STAGE 5 ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03550 R 0   MU 0.   FTA 0.

SECTION NO 9   SECTION JJ   RHO 4 5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0 06687	-0.67924	0.12629	-0.56179	0.30215
16	0 07117	-0.59213	0.06189	-0.47285	0.25276
17	0.07524	-0.50440	0.00140	-0.38453	0.20691
18	0.07905	-0.41610	-0.05525	-0.29678	0.16443
19	0 08262	-0 32728	-0.10813	-0.20954	0.12508
20	0.08590	-0.23793	-0.15735	-0.12284	0.08870
21	0 08887	-0.14804	-0.20291	-0.03667	0.05511
22	0 09148	-0.05765	-0.24480	0.04899	0.02412
23	0 09364	0.03326	-0.28293	0.13413	-0.00454
24	0 09522	0.12467	0 31717	0.21877	-0.03115
25	0.09609	0.21659	-0.34735	0.30292	0 05601
26	0 09611	0.30895	-0.37326	0.38660	-0 07944
27	0 09509	0.40171	-0.39465	0.46990	-0.10180
28	0 09287	0.49489	-0.41129	0.55278	-0.12337
29	0.08937	0.58848	-0.42293	0.63523	-0.14423
30	0 08454	0.68268	-0 42928	0.71709	0 16418
31	0 07854	0 77756	-0.42993	0.79827	-0.18245
32	0 07158	0.87341	-0.42416	0.87847	-0.19787
33	0 06389	0.97007	-0.41033	0.95786	-0.20865
34	0 05569	1 06676	-0 38636	1.03723	-0.21276
35	0 04703	1.16215	-0.34964	1.11789	-0.20767
36	0 03799	1.25545	-0.29631	1.20065	-0 18940
37	0 03025	1.32934	-0.23653	1.27346	-0 15888
38	0 02241	1 37416	0.19146	1.32489	-0.12898
39	0.02241	1.38415	-0.17146	· 1.35207	-0.12459
40	0.02241	1.37476	-0.13754	1.37476	-0.13754

| LF RAD | 0 01166 | CENTER AT ALPHA | -1.55:32 | UPSILON | 1.03305 |
| TF RAD | 0 04030 | CENTER AT ALPHA | 1.34452 | UPSILON | -0.16417 |

PHASE V ROTOR

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0. RHO 4.5000 ETA 0.

SECTION NO 9 SECTION JJ R 0.

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA
18	0.4700	0.08590	-0.18038	-0.03432	25.067
19	0.5000	0.08887	-0.09236	-0.07390	23.347
20	0.5300	0.09148	-0.00433	-0.11034	21.629
21	0.5600	0.09364	0.08370	-0.14374	19.918
22	0.5900	0.09522	0.17172	-0.17416	18.211
23	0.6200	0.09609	0.25975	-0.20168	16.506
24	0.6500	0.09611	0.34778	-0.22635	14.804
25	0.6800	0.09509	0.43580	-0.24872	13.107
26	0.7100	0.09287	0.52383	-0.26733	11.368
27	0.7400	0.08937	0.61186	-0.28358	9.522
28	0.7700	0.08454	0.69989	-0.29673	7.396
29	0.8000	0.07854	0.78791	-0.30619	4.784
30	0.8300	0.07158	0.87594	-0.31101	1.279
31	0.8600	0.06389	0.96397	-0.30949	-3.464
32	0.8900	0.05569	1.05199	-0.29956	-9.654
33	0.9200	0.04703	1.14002	-0.27865	-17.318
34	0.9500	0.03799	1.22805	-0.24285	-27.138
35	0.9750	0.03025	1.30140	-0.19771	-35.738
36	1.0000	0.02241	1.37476	-0.13754	-42.577

CHORD 3.1622

STAGGER 21.889

CAMBER 88.239

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.00680	-1.55947	1.04138	-1.55947	1.04138
2	0.00680	-1.56298	1.03290	-1.55103	1.04470
3	0.00680	-1.56029	1.02560	-1.54369	1.04185
4	0.01220	-1.49984	0.95318	-1.47239	0.98031
5	0.01755	-1.43237	0.87335	-1.39315	0.91261
6	0.02281	-1.36470	0.79451	-1.3.410	0.84590
7	0.02796	-1.29678	0.71681	-1.23531	0.78038
8	0.03300	-1.22851	0.64053	-1.15688	0.71643
9	0.03791	-1.15980	0.56605	-1.07887	0.65447
10	0.04266	-1.09062	0.49372	-1.00134	0.59484
11	0.04724	-1.02090	0.42382	-0.92435	0.53781
12	0.05252	-0.93657	0.34344	-0.83263	0.47299
13	0.05755	-0.85149	0.26702	-0.74165	0.41214
14	0.06234	-0.76571	0.1.465	-0.65138	0.35523

PHASE V ROTOR

STAGE 5. ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0.   SECTION JJ   MU 0.   NB 20   ETA 0.

SECTION NO 9   RHO 4.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA	THICKNESS	UPSILON
1	1.55947	45.662	0.02149	1.04138
2	-1.48029	45.333	0.03994	0.96095
3	-1.32200	44.458	0.07602	0.80310
4	-1.16425	42.985	0.11043	0.65178
5	-1.00704	40.735	0.14265	0.51026
6	-0.83489	37.673	0.17517	0.36896
7	0.64820	34.102	0.20704	0.23290
8	-0.46262	30.458	0.23533	0.11482
9	0.27835	26.846	0.26002	0.01351
10	-0.09541	23.354	0.28072	-0.07258
11	0.08582	19.896	0.29624	-0.14450
12	0.26491	16.497	0.30394	-0.20320
13	0.44161	13.125	0.30034	-0.24957
14	0.61525	9.527	0.28208	-0.28414
15	0.78481	4.872	0.24908	-0.30593
16	0.94915	-2.609	0.20626	-0.31027
17	1.10692	-14.408	0.15916	-0.28798
18	1.25663	-29.626	0.11066	0.22708
19	1.37476	-42.577	0.07088	-0.13754

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA
1	0.	0.00680	1.55947	1.04138	45.662
2	0.0250	0.01220	-1.48612	0.96674	45.331
3	0.0500	0.01755	-1.41276	0.89298	44.976
4	0.0750	0.02281	-1.33940	0.82021	44.556
5	0.1000	0.02796	-1.26605	0.74859	44.038
6	0.1250	0.03300	-1.19269	0.67848	43.344
7	0.1500	0.03791	-1.11934	0.61026	42.470
8	0.1750	0.04266	-1.04598	0.54428	41.442
9	0.2000	0.04724	-0.97263	0.48081	40.264
10	0.2300	0.05252	0.88460	0.40821	38.743
11	0.2600	0.05755	-0.79657	0.33958	37.121
12	0.2900	0.06234	0.70855	0.27494	35.449
13	0.3200	0.06687	0.62052	0.21422	33.738
14	0.3500	0.07117	-0.53249	0.15732	32.003
15	0.3800	0.07524	-0.44446	0.10416	30.254
16	0.4100	0.07905	-0.35644	0.05459	28.510
17	0.4400	0.08262	-0.26841	0.00848	26.785

PHASE V ROTOR

STAGE 5 ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0 MU 0. NB 20 ETA 0

SECTION NO 9   SECTION JJ   RHO 4.5000

CHORD   STAGGER   CAMBER
3.1622   21.889   88.239

AREA 0.665583   SURFACE ARC LENGTH 6.88268

	ALPHA	UPSILON
SECTION C.G.	-0.00938	-0.00316
STREAMSURFACE SECTION C.G.	0.04395	-0.05982
BLADE AXIS	0.04395	-0.05982
STACKING AXIS (RADIAL)	-0.00210	0

PHASE V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN 7 -7.03550 R 0.   MU 0   ETA 0

SECTION NO 10   SECTION KK   RHO 4.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA.	THICKNESS	UPSILON
1	-1.52240	44.396	0.02404	0.90484
2	-1.44396	43.947	0.04250	0.82906
3	-1.28795	42.677	0.07937	0.68228
4	-1.13352	40.558	0.11621	0.54474
5	-0.98049	37.668	0.15281	0.42014
6	0.81387	34.261	0.19189	0.29931
7	0.63404	30.576	0.23169	0.18577
8	-0.45599	26.824	0.26673	0.08810
9	0.28001	23.098	0.29489	0.00642
10	-0.10612	19.609	0.31396	-0.06143
11	0.06547	16.534	0.32236	-0.11753
12	0.23405	13.706	0.32021	-0.16347
13	0.39900	10.406	0.30992	-0.19948
14	0.55945	5.527	0.29519	-0.22290
15	0.71428	-2.504	0.27795	-0.22782
16	0.86246	-15.153	0.25417	-0.20468
17	1.00295	-31.540	0.21647	-0.14118
18	1.13541	-47.432	0.16550	-0.02427
19	1.23939	-57.937	0.11774	0.12411

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA.
1	0.0250	0.00838	-1.52240	0.90484	44.396
2	0.0500	0.01404	-1.45336	0.83806	43.777
3	0.0500	0.01971	-1.38431	0.77230	43.413
4	0.0750	0.02540	-1.31527	0.70754	42.887
5	0.1000	0.03111	-1.24622	0.64416	42.178
6	0.1250	0.03685	-1.17718	0.58257	41.253
7	0.1500	0.04261	-1.10813	0.52319	40.102
8	0.1750	0.04837	-1.03909	0.46633	38.823
9	0.2000	0.05411	-0.97004	0.41711	37.438
10	0.2300	0.06093	0.88719	0.35061	35.730
11	0.2600	0.06762	-0.80433	0.29284	34.031
12	0.2900	0.07413	-0.72148	0.23867	32.321
13	0.3200	0.08039	-0.63863	0.18798	30.587
14	0.3500	0.08633	-0.55577	0.14069	28.840
15	0.3800	0.09186	-0.47292	0.09669	27.093
16	0.4100	0.09692	-0.39007	0.05588	25.350
17	0.4400	0.10141	0.30721	0.01815	23.616

100

PHASE V ROTOR

STAGE 5   ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0   ETA 0

RHO 4.0000

SECTION NO 10   SECTION KK

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.10524	-0.22436	-0.01661	21.913
19	0.5000	0.10833	-0.14151	-0.04858	20.294
20	0.5300	0.11058	-0.05865	-0.07796	18.767
21	0.5600	0.11196	0.02420	-0.10434	17.319
22	0.5900	0.11246	0.10706	-0.12968	15.943
23	0.6200	0.11209	0.18991	-0.15229	14.577
24	0.6500	0.11094	0.27276	-0.17278	13.184
25	0.6800	0.10914	0.35562	-0.19099	11.554
26	0.7100	0.10683	0.43847	-0.20651	9.596
27	0.7400	0.10417	0.52132	-0.21869	7.005
28	0.7700	0.10125	0.60418	-0.22653	3.639
29	0.8000	0.09802	0.68703	-0.22866	-0.897
30	0.8300	0.09421	0.76989	-0.22326	-6.904
31	0.8600	0.08925	0.85274	-0.20739	-15.076
32	0.8900	0.08247	0.93559	-0.17756	-24.492
33	0.9200	0.07360	1.01845	-0.13111	-33.928
34	0.9500	0.06269	1.10130	-0.06226	-45.542
35	0.9750	0.05224	1.17034	0.02147	-54.319
36	1.0000	0.04103	1.23939	0.12411	-56.894

CHORD 2.8700

STAGGER 15.785

CAMBER 101.291

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00838	-1.52240	0.90484	-1.52240	0.90484
2	0.00838	-1.52610	0.89524	-1.51307	0.90879
3	0.00838	-1.52291	0.88715	-1.50475	0.90583
4	0.01404	-1.46729	0.82352	-1.43942	0.85260
5	0.01971	-1.40375	0.75175	-1.36488	0.79284
6	0.02540	-1.34007	0.68084	-1.29046	0.73424
7	0.03111	-1.27620	0.61108	-1.21624	0.67725
8	0.03685	-1.21205	0.54281	-1.14231	0.62233
9	0.04261	-1.14752	0.47642	-1.06874	0.56996
10	0.04837	-1.08260	0.41225	-0.99557	0.52041
11	0.05411	-1.01724	0.35046	-0.92284	0.47376
12	0.06093	-0.93825	0.27963	-0.83613	0.42158
13	0.06762	-0.85864	0.21243	-0.75003	0.37326
14	0.07413	-0.77836	0.14877	-0.66460	0.32857

101

PHASE V ROTOR

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R O. MU O. RHO 4.0000 ETA O

SECTION NO 10 SECTION KK

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PI	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.08039	-0.69733	0.08867	-0.57993	0.28729
16	0.08633	-0.61553	0.03217	-0.49602	0.24920
17	0.09186	-0.53296	-0.02067	-0.41288	0.21405
18	0.09692	-0.44961	-0.06981	-0.33052	0.18157
19	0.10141	-0.36551	-0.11519	-0.24891	0.15149
20	0.10524	-0.28072	-0.15672	-0.16800	0.12350
21	0.10833	-0.19542	-0.19438	-0.08759	0.09772
22	0.11058	-0.10970	-0.22821	-0.00760	0.07229
23	0.11196	-0.02363	-0.25832	0.07203	0.04845
24	0.11246	0.06273	-0.28485	0.15138	0.02549
25	0.11209	0.14943	-0.30796	0.23039	0.00338
26	0.11094	0.23645	-0.32779	0.30908	-0.01777
27	0.10914	0.32425	-0.34443	0.38699	-0.03754
28	0.10683	0.41291	-0.35768	0.46403	-0.05535
29	0.10417	0.50309	-0.36705	0.53956	-0.07033
30	0.10125	0.59496	-0.37153	0.61340	-0.08153
31	0.09802	0.68923	-0.36930	0.68483	-0.08802
32	0.09421	0.78614	-0.35747	0.75363	-0.08905
33	0.08925	0.88605	-0.33106	0.81943	-0.08372
34	0.08247	0.98465	-0.28525	0.88653	-0.06987
35	0.07360	1.07740	-0.21875	0.95949	-0.04347
36	0.06269	1.16551	-0.12527	1.03709	0.00075
37	0.05224	1.23123	-0.02225	1.10946	0.06519
38	0.04103	1.26270	0.03807	1.15183	0.11203
39	0.04103	1.26918	0.07637	1.19352	0.13452
40	0.04103	1.23939	0.12411	1.23939	0.12411

LE RAD 0.01307 CENTER AT ALPHA -1.51304 UPSILON 0.89572
TE RAD 0.06718 CENTER AT ALPHA 1.20253 UPSILON 0.06795

102

PHASE V ROTOR

STAGE 5 ROTOR

COORD SYSTEM ORIGIN Z -7 03550 R 0 MU 0. NB 20 FIA 0.

SECTION NO 10 SECTION KK RHO 101.291

CHORD 2 8700 STAGGER 15.785 CAMBER 101.291

AREA 0 700832 SURFACE ARC LENGTH 6.57755

	ALPHA	UPSILON
SECTION C.G.	0.01098	0 00936
STREAMSURFACE SECTION C G	-0.02331	-0.02376
BLADE AXIS	-0.02331	-0 02376
STACKING AXIS (RADIAL)	-0 00210	0.

103

.7PC.

PHASE V ROTOR

COORD SYSTEM ORIGIN Z -7.03550   R 0 | STAGE 5   ROTOR   MU 0   NB 20

SECTION NO 11   SECTION LL   RHO 3 5000   ETA 0

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.49793	41.682	0.02989	0.78342
2	-1.42205	40.787	0.05116	0.71655
3	-1.27143	38.665	0.09443	0.59017
4	-1.12740	36.218	0.13720	0.47549
5	-0.97488	33.728	0.17757	0.37206
6	-0.81420	30.947	0.21752	0.27010
7	0.64094	27.638	0.25461	0.17247
8	0.46974	24.065	0.28432	0.08921
9	-0.30092	20.569	0.30660	0.01979
10	-0.13476	17.672	0.32178	-0.03764
11	0.02831	15.266	0.33091	-0.08560
12	0.18773	12.582	0.33578	-0.12478
13	0.34279	8.419	0.33830	-0.15295
14	0.49243	1.293	0.33950	0.16443
15	0.63570	-10.440	0.33650	-0.15032
16	0.77103	-26.849	0.32003	-0.09833
17	0.89689	-44.291	0.28024	0.00642
18	1.01370	-58.153	0.22120	0.17879
19	.10399	-66.264	0.16462	0.38579

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AI	T/C	ALPHA	UPSILON	ZETA*
1	0	0.01136	-1.49793	0.78342	41.682
2	0 0250	0.01828	-1.43288	0.72582	41.238
3	0 0500	0.02531	-1.36783	0.66973	40.290
4	0 0750	0.03243	-1.30278	0.61554	39.287
5	0 1000	0.03958	-1.23774	0.56330	38.242
6	0 1250	0.04669	-1.17269	0.51302	37.159
7	0 1500	0.05370	-1.10764	0.46470	36.042
8	0 1750	0.06056	-1.042	0.41833	34.922
9	0 2000	0.06720	-0.97754	0.37385	33.814
10	0 2500	0.07481	-0.89949	0.32286	32.482
11	0 2600	0.08200	-0.82143	0.27445	31.122
12	0 2900	0.08871	-0.74337	0.22861	29.707
13	0 3200	0.09491	-0.66531	0.18541	28.198
14	0 3500	0.10056	-0.58726	0.14494	26.602
15	0 3800	0.10566	-0.50920	0.10722	24.964
16	0 4100	0.11019	-0.43114	0.07225	23.297
17	0 4400	0.11415	-0.35308	0.03995	21.667

104

PHASE V ROTOR

STAGE 5 ROTOR

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0   NR 20

SECTION NO 11   SECTION LE   RHO 3.5000   FIA 0

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.11755	-0.27502	0.01019	20.096
19	0.5000	0.12038	0.19697	0.01725	18.663
20	0.5300	0.12267	-0.11891	-0.04264	17.395
21	0.5600	0.12448	-0.04085	-0.06620	16.196
22	0.5900	0.12586	0.03721	-0.08800	15.016
23	0.6200	0.12688	0.11526	0.10802	13.713
24	0.6500	0.12761	0.19332	0.12600	12.188
25	0.6800	0.12815	0.27138	-0.14153	10.217
26	0.7100	0.12856	0.34944	-0.15386	7.618
27	0.7400	0.12887	0.42749	-0.16197	4.047
28	0.7700	0.12898	0.50555	-0.16436	-0.753
29	0.8000	0.12863	0.58361	-0.15918	-7.127
30	0.8300	0.12721	0.66167	-0.14399	-15.174
31	0.8600	0.12381	0.73972	-0.11506	-25.760
32	0.8900	0.11712	0.81778	-0.06680	-37.351
33	0.9200	0.10663	0.89584	0.00527	-47.480
34	0.9500	0.09252	0.97390	0.10802	-57.915
35	0.9750	0.07826	1.03894	0.23168	-65.595
36	1.0000	0.06254	1.10399	0.38579	-67.810

CHORD 2.639?

STAGGER 8.689   CAMBER 109.491

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.01136	-1.49793	0.78342	-1.49793	0.78342
2	0.01136	-1.50209	0.77113	-1.48653	0.78892
3	0.01136	-1.49781	0.76121	-1.47587	0.78582
4	0.01828	-1.44873	0.70773	-1.41702	0.74391
5	0.02531	-1.38937	0.64432	-1.34629	0.69513
6	0.03243	-1.32981	0.58251	-1.27575	0.64858
7	0.03758	-1.26998	0.52238	-1.20549	0.60422
8	0.04669	-1.20981	0.46404	-1.13557	0.56199
9	0.05570	-1.14922	0.40755	-1.06605	0.52185
10	0.06056	-1.08821	0.35299	-0.99697	0.48368
11	0.06720	-1.02676	0.30037	-0.92833	0.44732
12	0.07481	-0.95236	0.23980	-0.84661	0.40592
13	0.08200	-0.87721	0.18207	-0.76565	0.36684
14	0.08871	-0.80123	0.12721	-0.68551	0.33001

105

PHASE V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0 ETA 0

SECTION NO 11 SECTION LL RHO 3.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0.09491	-0.72433	0.07533	-0.60629	0.29549
16	0.10056	-0.64652	0.02660	-0.52799	0.26327
17	0.10566	-0.56788	-0.01884	-0.45051	0.23328
18	0.11019	-0.48849	-0.06094	-0.37379	0.20545
19	0.11415	-0.40855	0.09967	-0.29762	0.17958
20	0.11755	-0.32818	0.13510	-0.22187	0.15547
21	0.12038	-0.24766	-0.16735	-0.14627	0.13284
22	0.12267	-0.16718	-0.19670	-0.07064	0.11142
23	0.12448	-0.08655	-0.22352	0.00484	0.09112
24	0.12586	-0.00571	-0.24798	0.08012	0.07198
25	0.12688	0.07568	-0.27024	0.15485	0.05420
26	0.12761	0.15786	0.29016	0.22878	0.03817
27	0.12815	0.24146	0.30751	0.30129	0.02445
28	0.12856	0.32701	-0.32155	0.37187	0.01384
29	0.12887	0.41553	-0.33115	0.43946	0.00721
30	0.12898	0.50778	-0.33409	0.50332	0.00537
31	0.12863	0.60461	-0.32715	0.56261	0.00880
32	0.12721	0.70549	-0.30557	0.61784	0.01759
33	0.12381	0.81054	-0.26181	0.66891	0.03169
34	0.11712	0.91130	-0.18933	0.72427	0.05574
35	0.10663	0.99927	-0.08958	0.79240	0.10011
36	0.09252	1.07706	0.04334	0.87074	0.17269
37	0.07826	1.13274	0.18913	0.94515	0.27424
38	0.06254	1.15816	0.27426	0.98724	0.34559
39	0.06254	1.15667	0.32967	1.03737	0.38755
40	0.06254	1.10399	0.38579	1.10399	0.38579

LE RAD 0.01658 CENTER AT ALPHA -1.48556 UPSILON 0.77237
TE RAD 0.09328 CENTER AT ALPHA 1.06838 UPSILON 0.29957

PHASE J ROTOR

                  STAGE   5   ROTOR   NR   20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   ETA 0

    SECTION NO 11   SECTION LI   RHO 3.5000

        CHORD   STAGGER   CAMBER
        2.6321   8.689   109.491

    AREA   0.766460   SURFACE ARC LENGTH   6.41009

                                    ALPHA   UPSILON
    SECTION C.G.   0.03179   0.04938
    STREAMSURFACE SECTION C.G.   -0.00140   -0.00773
    BLADE AXIS   -0.00140   0.00773
    STACKING AXIS (RADIAL)   -0.00210   0.

PHASE V ROTOR

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0. MU 0 ETA 0.

SECTION NO 12 SECTION MM RHO 3.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA.	THICKNESS	UPSILON
1	-1.48310	37.748	0.04055	0.68860
2	-1.40932	36.771	0.06281	0.63297
3	-1.26309	34.892	0.10561	0.52856
4	1.11859	33.152	0.14519	0.43207
5	0.97584	31.382	0.18088	0.34260
6	0.82058	29.012	0.21549	0.25268
7	0.65338	25.717	0.24812	0.16638
8	0.48848	22.016	0.27578	0.09433
9	0.32613	18.625	0.29906	0.03552
10	-0.16679	16.303	0.31846	-0.01292
11	-0.01123	14.402	0.33529	-0.05375
12	0.13997	11.633	0.35127	-0.08649
13	0.28593	6.450	0.36773	-0.10666
14	0.42525	-2.957	0.36429	-0.10600
15	0.55711	-17.994	0.39506	-0.07281
16	0.67960	-36.561	0.38589	0.00802
17	0.79084	-53.213	0.34401	0.15401
18	0.89200	-64.861	0.27691	0.38185
19	0.96860	-71.285	0.21149	0.64746

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA.
1	0.	0.01654	-1.48310	0.68860	37.748
2	0.0250	0.02409	-1.42181	0.64222	36.583
3	0.0500	0.03154	-1.36052	0.59735	35.828
4	0.0750	0.03885	-1.29923	0.55371	35.067
5	0.1000	0.04597	-1.23793	0.51131	34.291
6	0.1250	0.05288	-1.17664	0.47009	33.552
7	0.1500	0.05956	-1.11535	0.42998	32.865
8	0.1750	0.06598	-1.05406	0.39089	32.171
9	0.2000	0.07212	-0.99276	0.35289	31.419
10	0.2300	0.07912	-0.91921	0.30882	30.417
11	0.2600	0.08572	-0.84566	0.26660	29.259
12	0.2900	0.09191	-0.77211	0.22648	27.943
13	0.3200	0.09775	-0.69856	0.18863	26.488
14	0.3500	0.10326	-0.62501	0.15323	24.896
15	0.3800	0.10837	-0.55146	0.12038	23.218
16	0.4100	0.11314	-0.47791	0.09014	21.470
17	0.4400	0.11758	-0.40436	0.06246	19.805

PHASE V ROTOR

STAGE 5 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0.   ETA 0

SECTION NO 12   SECTION MM   RHO 3.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA
18	0.4700	0.12171	-0.33080	0.03706	18.323
19	0.5000	0.12553	-0.25725	0.01364	17.038
20	0.5300	0.12909	-0.18370	0.00812	15.956
21	0.5600	0.13244	-0.11015	-0.02849	15.003
22	0.5900	0.13565	-0.03660	-0.04752	13.991
23	0.6200	0.13880	0.03695	-0.06510	12.832
24	0.6500	0.14197	0.11050	-0.08083	11.245
25	0.6800	0.14522	0.18405	-0.09413	9.109
26	0.7100	0.14861	0.25760	-0.10401	6.038
27	0.7400	0.15218	0.33115	-0.10923	1.807
28	0.7700	0.15576	0.40471	-0.10787	-4.271
29	0.8000	0.15900	0.47826	-0.09751	-12.162
30	0.8300	0.16105	0.55181	-0.07500	-22.031
31	0.8600	0.16058	0.62536	-0.03602	-34.076
32	0.8900	0.15544	0.69891	0.02765	-47.059
33	0.9200	0.14409	0.77246	0.12412	-57.553
34	0.9500	0.12670	0.84601	0.26172	-66.187
35	0.9750	0.10788	0.90730	0.42974	-72.902
36	1.0000	0.08625	0.96860	0.64746	-74.886

CHORD 2.4520

STAGGER 0.961

CAMBER 112.634

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.01654	-1.48310	0.68860	-1.48310	0.68860
2	0.01654	-1.48758	0.67139	-1.46822	0.69732
3	0.01654	-1.48089	0.65830	-1.45338	0.69440
4	0.02409	-1.43941	0.61850	-1.40421	0.66593
5	0.03154	-1.38315	0.56600	-1.33788	0.62871
6	0.03885	-1.32659	0.51473	-1.27186	0.59270
7	0.04597	-1.26969	0.46474	-1.20618	0.55787
8	0.05288	-1.21248	0.41606	-1.14081	0.52413
9	0.05956	-1.15497	0.36864	-1.07572	0.49131
10	0.06598	-1.09713	0.32243	-1.01099	0.45936
11	0.07212	-1.03886	0.27743	-0.94667	0.42835
12	0.07912	-0.96832	0.22516	-0.87010	0.39247
13	0.08572	-0.89703	0.17492	-0.79430	0.35829
14	0.09194	-0.82493	0.12690	-0.71929	0.32606

PHASE V ROTOR

STAGE 5. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   MU 0   ETA 0.

SECTION NO 12   SECTION MM   RHO 3.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
15	0 09778	-0 75203	0 08133	-0 64509	0 29593
16	0 10326	-0 67830	0 03840	-0 57172	0 26806
17	0 10837	-0 60384	-0 00172	-0 49908	0 24248
18	0 11314	-0 52868	-0 03894	-0 42714	0 21922
19	0 11758	-0 45320	-0 07318	-0 35551	0 19809
20	0 12171	-0 37772	-0 10460	-0 28389	0 17872
21	0 12553	-0 30235	-0 13351	-0 21216	0 16079
22	0 12909	-0 22721	-0 16029	-0 14020	0 14405
23	0 13244	-0 15219	-0 18533	-0 06812	0 12834
24	0 13565	-0 07681	-0 20889	0 00361	0 11385
25	0 13880	-0 00084	-0 23102	0 07474	0 10083
26	0 14197	0 07656	-0 25155	0 14444	0 08988
27	0 14522	0 15587	-0 26992	0 21224	0 08167
28	0 14861	0 23844	-0 28521	0 27677	0 07718
29	0 15218	0 32527	-0 29572	0 33704	0 07725
30	0 15576	0 41876	-C 29832	0 39065	0 08258
31	0 15900	0 51933	-0 28808	0 43719	0 09305
32	0 16105	0 62587	-0 25803	0 47774	0 10803
33	0 16058	0 73567	-0 19909	0 51505	0 12705
34	0 15544	0 83842	-0 10218	0 55940	0 15747
35	0 14409	0 92120	0 02882	0 62372	0 21942
36	0 12670	0 98812	0 19900	0 70390	0 32443
37	0 10788	1 03372	0 39085	0 78089	0 46862
38	0 08625	1 05462	0 51450	0 82696	0 57737
39	0 08625	1 04359	0 58578	0 88283	0 63854
40	0 08625	0 96860	0 64746	0 96860	0 64746

LE RAD	0.02286	CENTER AT ALPHA	-1 46496	UPSILON	0.67469
TE RAD	0.11888	CENTER AT ALPHA	0.93717	UPSILON	0.53281

STAGE 5 ROTOR   MU 0.   NB 20

COORD SYSTEM ORIGIN Z -7.03550 R 0.   ETA 0.

SECTION NO 12   SECTION MM   RHO 3.0000

CHORD 2.4520   STAGGER 0.961   CAMBER 112.634

AREA 0.825127   SURFACE ARC LENGTH 6.37144

	ALPHA	UPSILON
SECTION C.G.	0.07309	0.10928
STREAMSURFACE SECTION C.G.	0.04568	0.00113
BLADE AXIS	0.04568	0.00113
STACKING AXIS (RADIAL)	-0.00210	0.

STAGE 5. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03550 R O. MU O. FIA O.

SECTION NO 13 SECTION NN RHO 2.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46924	33.576	0.05423	0.61513
2	-1.39769	32.933	0.07404	0.56886
3	-1.25591	31.859	0.11165	0.48032
4	-1.11609	30.865	0.14611	0.39628
5	0.97791	29.543	0.17726	0.31695
6	0.82781	27.313	0.20803	0.23691
7	0.66636	23.866	0.23829	0.16134
8	0.50752	19.957	0.26566	0.09967
9	-0.35145	16.652	0.29103	0.05131
10	-0.19882	14.917	0.31509	0.01180
11	0.05078	13.531	0.33966	-0.02190
12	0.09221	10.677	0.36676	-0.04820
13	0.22907	4.465	0.39715	-0.06036
14	0.35807	-7.175	0.42909	-0.04757
15	0.47852	-24.955	0.45363	0.00470
16	0.58818	-44.334	0.45175	0.11437
17	0.68478	-59.572	0.40778	0.30161
18	0.77029	-69.341	0.33261	0.58491
19	0.83320	-74.596	0.25837	0.90913

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.02337	-1.46924	0.61513	33.023
2	0.0500	0.03024	-1.41168	0.57784	32.771
3	0.0500	0.03699	-1.35412	0.54120	32.192
4	0.0750	0.04357	-1.29656	0.50531	31.716
5	0.1000	0.04996	-1.23900	0.47000	31.358
6	0.1250	0.05616	-1.18144	0.43516	30.990
7	0.1500	0.06215	-1.12387	0.40088	30.564
8	0.1750	0.06793	-1.06631	0.36721	30.069
9	0.2000	0.07348	-1.00875	0.33426	29.486
10	0.2300	0.07986	-0.93968	0.29584	28.650
11	0.2600	0.08597	-0.87061	0.25890	27.581
12	0.2900	0.09183	-0.80153	0.22379	26.263
13	0.3200	0.09746	-0.73246	0.19079	24.783
14	0.3500	0.10289	-0.66339	0.16006	23.160
15	0.3800	0.10811	-0.59431	0.13173	21.419
16	0.4100	0.11317	0.52524	0.10589	19.584
17	0.4400	0.11811	-0.45617	0.08257	17.767

PHASE V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN Z -7.03550 R O MU C ETA O.

SECTION NO 13 SECTION NN RHO 2.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA.
18	0.4700	0.12293	-0.38709	0.06147	16.255
19	0.5000	0.12766	-0.31802	0.04214	15.068
20	0.5300	0.13234	-0.24895	0.02417	14.136
21	0.5600	0.13705	-0.17987	0.00724	13.437
22	0.5900	0.14191	-0.11080	-0.00880	12.690
23	0.6200	0.14702	-0.04173	-0.02380	11.783
24	0.6500	0.15249	0.02735	-0.03741	10.379
25	0.6800	0.15838	0.09642	-0.04882	8.256
26	0.7100	0.16476	.16549	-0.05701	5.079
27	0.7400	0.17167	0.23457	-0.06042	0.382
28	0.7700	0.17903	0.30364	-0.05704	-6.420
29	0.8000	0.18640	0.37271	-0.04377	-15.653
30	0.8300	0.19289	0.44178	-0.01683	-27.093
31	0.8600	0.19684	0.51086	0.02872	-39.718
32	0.8900	0.19535	0.57993	0.10289	-53.564
33	0.9200	0.18490	0.64900	0.22029	-64.177
34	0.9500	0.16482	0.71808	0.39266	-71.738
35	0.9750	0.14078	0.77564	0.60915	-77.786
36	1.0000	0.11131	0.83320	0.90913	79.709

CHORD 2.3211

STAGGER -7.277

CAMBER 112.731

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.02337	-1.46924	0.61513	-1.46924	0.61513
2	0.02337	-1.47346	0.59194	-1.45012	0.62830
3	0.02337	-1.46314	0.57505	-1.43019	0.62582
4	0.03024	-1.43068	0.54833	-1.39268	0.60735
5	0.03699	-1.37699	0.50487	-1.33125	0.57753
6	0.04357	-1.32314	0.46230	-1.26998	0.54832
7	0.04996	-1.26917	0.42049	-1.20882	0.51951
8	0.05616	-1.21500	0.37929	-1.14788	0.49104
9	0.06215	-1.16056	0.33876	-1.08719	0.46299
10	0.06793	-1.10581	0.29898	-1.02681	0.43543
11	0.07348	-1.05073	0.26003	-0.96678	0.40850
12	0.07986	-0.98412	0.21450	-0.89524	0.37718
13	0.08597	-0.91680	0.17047	-0.82441	0.34733
14	0.09183	-0.84869	0.12823	-0.75438	0.31936

PHASE V ROTOR

| | | STAGE 5 | ROTOR | | NR | 20 |

COORD SYSTEM ORIGIN Z -7.03550 R 0 MU 0 ETA 0

SECTION NO 13 SECTION NN RHO 2.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0 09746	-0 77988	0.08810	-0 68504	0 29349
16	0 10289	-0 71035	0.05027	-0 61642	0.26985
17	0 10811	-0.64013	0.01493	-0.54849	0.24854
18	0 11317	-0 56927	-0 01785	-0.48121	0.22964
19	0 11811	-0 49799	-0.04796	-0 41434	0 21311
20	0 12293	-0 42703	-0 07550	-0.34716	0 19844
21	0 12766	-0.35654	-0 10092	-0.27950	0.18520
22	0 13234	0.28646	-0.12476	-0.21144	0.17310
23	0 13705	-0.21683	-0 14747	-0.14291	0.16194
24	0 14191	-0 14698	-0.16948	-0.07462	0 15187
25	0 14702	-0.07657	-0.19084	-0.00688	0 14323
26	0 15249	-0.00454	-0.21148	0.05923	0.13667
27	0 15838	0.07002	-0.23072	0.12281	0.13309
28	0 16476	0.14873	-0.24749	0.18225	0.13348
29	0 17167	0.23324	-0.25965	0.23590	0.13882
30	0 17903	0.32687	-0 26352	0 28041	0.14944
31	0 18640	0.43108	-0.25207	0 31434	0.16454
32	0 19289	0.54374	-0.21613	0 33983	0 18747
33	0 19684	0.65683	-0.14700	0.36488	0.20443
34	0 19535	0.76233	0.031?7	0.39753	0.23754
35	0 18490	0 84216	0 12681	0 45584	0.31376
36	0 16482	0.89973	0.33272	0.53643	0.45260
37	0 14078	0.93533	0 57458	0.61595	0.64371
38	0 11131	0.95078	0.75686	0.66921	0.80908
39	0 11131	0.92975	0 84303	0.72959	0.88886
40	0 11131	0 83320	0.90913	0 83320	0 90913

LE RAD 0 03047 CENTER AT ALPHA -1.44371 UPSILON 0.59852
TE RAD 0 14405 CENTER AT ALPHA 0.80712 UPSILON 0.76746

.7PC.

PHASE V ROTOR

STAGE 5 ROTOR NR 20

COORD SYSTEM ORIGIN 7 -7 03550 R 0 MU 0. ETA 0

SECTION NO 13 SECTION NN RHO 2.5000

CHORD STAGGER CAMBER
2 3711 -7 277 112 731

AREA 0.902026 SURFACE ARC LENGTH 6 42542

	ALPHA	UPSILON
SECTION C G.	0.10985	0 19507
STREAMSURFACE SECTION C G	0 09277	0 00999
BLADE AXIS	0 09277	0 00999
STACKING AXIS (RADIAL)	0 00210	0

115

PHASE V ROTOR

ZPC

				STAGE	5	ROTOR		NB	20	
SECT	NO	RHO	CHORD	STAGGER	CAMBER	TM/C	ZETA1*	ZETA2*
AA	1	8.50000	3.8302	59.29	1.18	0.02514	57.67	56.49
BB	2	8.00000	3.9139	55.63	4.31	0.02615	55.32	51.21
CC	3	7.50000	3.9448	51.79	7.53	0.03067	53.92	46.39
DD	4	7.00000	3.9128	47.64	12.65	0.03959	52.58	39.93
EE	5	6.50000	3.8240	42.94	19.95	0.05184	51.37	31.43
FF	6	6.00000	3.7383	38.20	29.74	0.06273	50.44	20.70
GG	7	5.50000	3.6357	32.36	44.77	0.07256	49.15	4.38
HH	8	5.00000	3.4576	27.10	63.51	0.08342	47.28	-16.23
JJ	9	4.50000	3.1622	21.89	88.24	0.09611	45.66	-42.58
KK	10	4.00000	2.8700	15.79	101.29	0.11246	44.40	-56.89
LL	11	3.50000	2.6321	8.69	109.49	0.12898	41.68	-67.81
MM	12	3.00000	2.4520	0.96	112.63	0.16105	37.75	74.89
NN	13	2.50000	2.3211	-7.28	112.73	0.19684	33.02	79.71

THE COORDINATES FOR THIS BLADE WERE PUT ON TAPE

IN THE SAME ORDER AS PRINTED ABOVE

116

SECTION XVIII

REFERENCES

1. A.J. Wennerstrom, and W.A. Buzzell, _Redesign of a Rotor for a 1500 ft/sec Transonic, High-Through-Flow, Single-Stage Axial-Flow Compressor with Low Hub/Tip Ratio_, Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio 45433, AFAPL-TR-2078, September 1979.

2. George R. Frost, Richard M. Hearsey, Arthur J. Wennerstrom, _A Computer Program for the Specification of Axial Compressor Airfoils_, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433, ARL 72-0171,

3. Richard M. Hearsey, _A Revised Computer Program for Axial Compressor Design Volume I_, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433, ARL TF 75-0001, January 1975.

4. Arthur J. Wennerstrom, Personal Communication to L.H. Smith of General Electric Company, September 12, 1980.